

















# **FOOD TECHNOLOGY ABSTRACTS**

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**CONTENTS**

	<b>Page No</b>
General	... 1
Food Processing	... 1
Food Packaging	... 1
Food Engineering and Equipment	... 2
Energy in Food Processing	... -
Food Chemistry and Analysis	... 3
Food Microbiology and Hygiene	... 5
Biotechnology	... 9
Tissue Culture	... -
Food Additives	... 9
Cereals	... 10
Milletts	... 14
Pulses	... 16
Oilseeds and Nuts	... 17
Tubers and Vegetables	... 19
Fruits	... 21
Confectionery, Starch and Sugar	... 22
Bakery products	... 24
Milk and Dairy products	... 27
Meat and Poultry	... 30
Seafoods	... 31
Protein Foods	... -
Alcoholic and Non-alcoholic Beverages	... 32
Fats and oils	... 35
Spices and Condiments	... 39
Sensory Evaluation	... 40
Food Storage	... -
Infestation Control and Pesticides	... 40
Biochemistry and Nutrition	... 41
Toxicology	... 43
Food Laws and Regulations	... 44
Author Index	... 45
Subject Index	... 53



## ABBREVIATIONS

A	ampere	g	gram	qt	quart
AAS	atomic absorption Spectrometry	GC	gas chromatography	R	rontgen
abstr.	abstract	gn	gravity	rad	rad or radian
ad lib.	ad libitum	gal	gallon	ref.	reference(s)
ADP	adenosine diphosphate	gf	gram-force	rev/min	revolutions per minute
Anon.	Anonymous	GLC	gas-liquid chromatography	RH	relative humidity
AOAC	Association of Official Analytical Chemists	h	hour	RNA	ribonucleic acid(s)
approx.	approximately	ha	hectare	S.	south, Southern, etc.
atm	atmosphere	HDPE	high density polyethylene	s.d.	standard deviation
ATP	adenosine triphosphate	hl	hectolitre [100 l]	SDS	sodium dedecylsulphate
$a_w$	water activity	hp	horse power	s.e.	standard error
BHA	butylated hydroxyanisole	HPLC	high performance/pressure liquid chromatography	s	second [time]
BHT	butylated hydroxytoluene	HTST	high temperature short time	SNF	solids-not-fat
BOD	biological oxygen demand	Hz	hertz [frequency cycle/s]	sp., spp.	species
b.p.	boiling point	in	inch	sp.gr.	specific gravity
Btu	British thermal unit	IR	infrared	summ.	summary
c-	centi- [as in cm, cm <sup>2</sup> , cm <sup>3</sup> ]	IU	international unit	Suppl.	Supplement
cal	calorie	J	joule	t	metric tonne
cd	candela	k-	kilo- [as in kcal, kg]	temp.	temperature
Ci	curie	K	Kelvin	TLC	thin layer chromatography
CMC	carboxymethyl cellulose	l	litre	TS	total solids
COD	chemical oxygen demand	lb	pound	UHT	ultra-high temperature
coeff.	coefficient	lb	pound-force	UV	ultraviolet
conc.	concentrated	LDPE	low density polyethylene	V	volt
concn.	concentration	m-	milli- [as in mg, ml, mm]	var.	variety
cv.	cultivar	m-equiv	milli-equivalent	vol.	volume
cwt	hundredweight	m	molar concentration	v/v	volume/volume
d-	deci-	M-	mega- [as in Mrad]	w	watt
DE	dextrose equivalent	max.	maximum	W.	West, Western, etc.
detrn.	determination	min	minute [time]	WHO	World Health Organization
DFD	dark firm dry	min.	minimum	w/v	weight/volume
diam.	diameter	mol	mole	wk	week
dil.	dilute	mol.wt	.molecular weight	wt.	weight
DM	dry matter, Deutsche Mark	m.p.	melting point	yd	yard
DNA	deoxyribonucleic acid(s)	MPN	most probable number	yr	year
dyn	dyne	MS	mass-spectrometry	$\mu$	micro-[as in g, m]
E.	East, Eastern, etc	n-	nano-[10 <sup>-9</sup> , as in nm]	%:	per centum
ECD.	electron capture detection	N	Newton [kg m/s <sup>2</sup> ]	>	greater than
EDTA	ethylenediaminetetra acetic acid	N.	North, Northern, normal concentration	>=	greater than or equal to;
Eh	oxidation-reduction potential	NMR	nuclear magnetic resonance	<	not less than
ELISA	enzyme-linked immunosorbent assay	NPU	net protein utilization	<=	less than
f-	femto-[10 <sup>-15</sup> , as in fCi]	oz	ounce		less than or equal to;
°F	degree Fahrenheit	p-	pico- [10 <sup>-12</sup> , as in pCi]		not greater than
FAO	Food and Agricultural Organization	P	poise	Chemical symbols are used for all elements	
FDA	Food and Drug Administration	P	probability	ABBREVIATIONS FOR LANGUAGE	
FID	flame ionization detection	Pa	Pascal [N/m <sup>2</sup> ]	Language of text	
fl oz	fluid ounce	PAGE	polyacrylamide gel electrophoresis	Dutch	Nl
f.p.	freezing point	PER	protein efficiency ratio	French	Fr
ft	foot, feet	p.p.b.	parts per billion	German	De
		p.p.m.	parts per million	Italian	It
		PSE	pale soft exudative polytetrafluorethylene	Japanese	Ja
		PTE	polytetrafluorethylene	Norwegian	No
		PVC	polyvinyl chloride	spanish	Es
		PVDC	polyvinylidene chloride	swedish	Sv



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**CONTENTS**

---

	<b>Page No</b>
General	... 65
Food Processing	... 65
Food Packaging	... 65
Food Engineering and Equipment	... 66
Energy in Food Processing	... -
Food Chemistry and Analysis	... 69
Food Microbiology and Hygiene	... 71
Biotechnology	... 72
Tissue Culture	... -
Food Additives	... 72
Cereals	... 73
Millet	... 77
Pulses	... 79
Oilseeds and Nuts	... 80
Tubers and Vegetables	... 82
Fruits	... 84
Confectionery, Starch and Sugar	... 87
Bakery products	... 90
Milk and Dairy products	... 93
Meat and Poultry	... 98
Seafoods	... 103
Protein Foods	... 103
Alcoholic and Non-alcoholic Beverages	... 104
Fats and oils	... 106
Spices and Condiments	... 107
Sensory Evaluation	... 107
Food Storage	... -
Infestation Control and Pesticides	... 108
Biochemistry and Nutrition	... 108
Toxicology	... 110
Food Laws and Regulations	... 110
Author Index	... 113
Subject Index	... 121



## ABBREVIATIONS

A	ampere
AAS	atomic absorption spectrometry
ADP	adenosine diphosphate
Anon.	Anonymous
AOAC	Association of Official Analytical Chemists
approx.	approximately
atm	atmosphere
ATP	adenosine triphosphate
$a_w$	water activity
BHA	butylated hydroxyanisole
BHT	butylated hydroxytoluene
BOD	biological oxygen demand
b.p.	boiling point
Btu	British thermal unit
c-	centi- [as in cm, cm <sup>2</sup> , cm <sup>3</sup> ]
cal	calorie
cd	candela
°C	degree centigrade
Ci	curie
CMC	carboxymethyl cellulose
COD	chemical oxygen demand
coeff.	coefficient
conc.	concentrated
concn.	concentration
cv.	cultivar
cwt	hundredweight
d-	deci-
DE	dextrose equivalent
detn.	determination
DFD	dark firm dry
diam.	diameter
dil.	dilute
DM	dry matter, Deutsche Mark
DNA	deoxyribonucleic acid(s)
dyn	dyne
E.	East, Eastern, etc
ECD.	electron capture detection
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Eh	oxidation-reduction potential
ELISA	enzyme-linked immunosorbent assay
f-	femto-[10 <sup>-15</sup> , as in fCi]
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FAO	Food and Agricultural Organization
FDA	Food and Drug Administration
FID	flame ionization detection
fl oz	fluid ounce
f.p.	freezing point
ft	foot, feet
g	gram

GC	gas chromatography
gr	gravity
gal	gallon
gf	gram-force
GLC	gas-liquid chromatography
h	hour
ha	hectare
HDPE	high density polyethylene
hl	hectolitre [100 l]
hp	horse power
HPLC	high performance/pressure liquid chromatography
HTST	high temperature short time
Hz	hertz [frequency cycles/s]
in	inch
IR	infrared
IU	international unit
J	joule
k-	kilo- [as in kcal, kg]
K	Kelvin
l	litre
lb	pound
lbf	pound-force
LDPE	low density polyethylene
m-	milli- [as in mg, ml, mm]
m-equiv	milli-equivalent
M	molar concentration
M-	mega- [as in Mrad]
max.	maximum
min	minute [time]
min.	minimum
mol	mole
mol.wt.	molecular weight
m.p.	melting point
MPN	most probable number
MS	mass-spectrometry
n-	nano-[10 <sup>-9</sup> , as in nm]
N	Newton [kg m/s <sup>2</sup> ]
N.	North, Northern, etc
N	Normal concentration
NMR	nuclear magnetic resonance
NPU	net protein utilization
oz	ounce
p-	pico- [10 <sup>-12</sup> , as in pCi]
P	Poise
p	probability
Pa	pascal (N/m <sup>2</sup> )
PAGE	polyacrylamide gel electrophoresis
PER	protein efficiency ratio
p.p.b.	parts per billion
p.p.m.	parts per million
PSE	pale soft exudative
PTFE	polytetrafluorethylene
PVC	polyvinyl chloride
PVDC	polyvinylidene chloride

qt	quart
R	rontgen
rad	rad or radian
ref.	reference(s)
rev/min	revolutions per minute
RH	relative humidity
RNA	ribonucleic acid(s)
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SDS	sodium dodecylsulphate
s.e.	standard error
s	second [time]
SNF	solids-not-fat
sp., spp.	species
sp.gr.	specific gravity
summ.	summary
Suppl.	Supplement
t	metric tonne
temp.	temperature
TLC	thin layer chromatography
TS	total solids
UHT	ultra-high temperature
UV	ultraviolet
V	volt
var.	variety
vol.	volume
v/v	volume/volume
W	watt
W.	West, Western, etc.
WHO	World Health Organization
w/v	weight/volume
wk	week
wt.	weight
yd	yard
yr	year
μ	micro-[as in g, μm]
%	per centum
>	greater than
≥	greater than or equal to; not less than
<	less than
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## ABBREVIATIONS FOR LANGUAGES

Language of text	
Dutch	Nl
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**CONTENTS**

---

	<b>Page No</b>
General	... 135
Food Processing	... 135
Food Packaging	... 135
Food Engineering and Equipment	... 136
Energy in Food Processing	... -
Food Chemistry and Analysis	... 137
Food Microbiology and Hygiene	... 138
Biotechnology	... 140
Tissue Culture	... -
Food Additives	... 141
Cereals	... 141
Millet	... 144
Pulses	... 144
Oilseeds and Nuts	... 146
Tubers and Vegetables	... 148
Fruits	... 151
Confectionery, Starch and Sugar	... 153
Bakery products	... 153
Milk and Dairy products	... 153
Meat and Poultry	... 158
Seafoods	... 161
Protein Foods	... 161
Alcoholic and Non-alcoholic Beverages	... 162
Fats and oils	... 164
Spices and Condiments	... 166
Sensory Evaluation	... 166
Food Storage	... 167
Infestation Control and Pesticides	... 167
Biochemistry and Nutrition	... 168
Toxicology	... -
Food Laws and Regulations	... 169
Author Index	... 171
Subject Index	... 177

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g	gram	p.p.b.	parts per billion		
		p.p.m.	parts per million		
		PSE	pale soft exudative		
		PTFE	polytetrafluorethylene		
		PVC	polyvinyl chloride		
		PVDC	polyvinylidene chloride		

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**CONTENTS**

	<b>Page No</b>
General	... 187
Food Processing	... 187
Food Packaging	... 187
Food Engineering and Equipment	... 187
Energy in Food Processing	... -
Food Chemistry and Analysis	... 189
Food Microbiology and Hygiene	... 190
Biotechnology	... 192
Tissue Culture	... -
Food Additives	... 192
Cereals	... 193
Millets	... 195
Pulses	... 195
Oilseeds and Nuts	... 196
Tubers and Vegetables	... 200
Fruits	... 202
Confectionery, Starch and Sugar	... 203
Bakery products	... 205
Milk and Dairy products	... 206
Meat and Poultry	... 211
Seafoods	... 218
Protein Foods	... 221
Alcoholic and Non-alcoholic Beverages	... 221
Fats and oils	... 223
Spices and Condiments	... 227
Sensory Evaluation	... 228
Food Storage	... 229
Infestation Control and Pesticides	... 229
Biochemistry and Nutrition	... 230
Toxicology	... -
Food Laws and Regulations	... 231
Author Index	... 233
Subject Index	... 241

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**CONTENTS**

**Page No**

General	... 255
Food Processing	... 255
Food Packaging	... 255
Food Engineering and Equipment	... 255
Energy in Food Processing	... -
Food Chemistry and Analysis	... 256
Food Microbiology and Hygiene	... 258
Biotechnology	... 261
Tissue Culture	... -
Food Additives	... 261
Cereals	... 262
Millet	... 262
Pulses	... 263
Oilseeds and Nuts	... 265
Tubers and Vegetables	... 268
Fruits	... 270
Confectionery, Starch and Sugar	... 271
Bakery products	... 271
Milk and Dairy products	... 273
Meat and Poultry	... 282
Seafoods	... 289
Protein Foods	... 291
Alcoholic and Non-alcoholic Beverages	... 291
Fats and oils	... 294
Spices and Condiments	... 297
Sensory Evaluation	... 298
Food Storage	... 299
Infestation Control and Pesticides	... 299
Biochemistry and Nutrition	... 299
Toxicology	... 301
Food Laws and Regulations	... -
Author Index	... 303
Subject Index	... 311

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HTST	high temperature short time
Hz	hertz [frequency cycles/s]
in	inch
IR	infrared
IU	international unit
J	joule
k-	kilo- [as in kcalc, kg]
K	Kelvin
l	litre
lb	pound
lbf	pound-force
LDPE	low density polyethylene
m-	milli- [as in mg, ml, mm]
m-equiv	milli-equivalent
M	molar concentration
M-	mega- [as in Mrad]
max.	maximum
min	minute [time]
min.	minimum
mol	mole
mol.wt.	molecular weight
m.p.	melting point
MPN	most probable number
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qt	quart
R	rontgen
rad	rad or radian
ref.	reference(s)
rev/min	revolutions per minute
RH	relative humidity
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S.	South, Southern, etc.
s.d.	standard deviation
SDS	sodium dodecylsulphate
s.e.	standard error
s	second [time]
SNF	solids-not-fat
sp., spp.	species
sp.gr.	specific gravity
summ.	summary
Suppl.	Supplement
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---

**CONTENTS**

---

	<b>Page No</b>
General	... 325
Food Processing	... 326
Food Packaging	... 326
Food Engineering and Equipment	... 327
Energy in Food Processing	... -
Food Chemistry and Analysis	... 327
Food Microbiology and Hygiene	... 328
Biotechnology	... -
Tissue Culture	... -
Food Additives	... 330
Cereals	... 330
Millets	... -
Pulses	... 331
Oilseeds and Nuts	... 331
Tubers and Vegetables	... 334
Fruits	... 337
Confectionery, Starch and Sugar	... 340
Bakery products	... 341
Milk and Dairy products	... 342
Meat and Poultry	... 346
Seafoods	... 351
Protein Foods	... 354
Alcoholic and Non-alcoholic Beverages	... 354
Fats and oils	... 358
Spices and Condiments	... 359
Sensory Evaluation	... 359
Food Storage	... -
Infestation Control and Pesticides	... 360
Biochemistry and Nutrition	... 360
Toxicology	... 363
Food Laws and Regulations	... -
Author Index	... 365
Subject Index	... 371

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---

**CONTENTS**

---

	<b>Page No</b>
General	... 551
Food Processing	... 551
Food Packaging	... 551
Food Engineering and Equipment	... 552
Energy in Food Processing	... -
Food Chemistry and Analysis	... 552
Food Microbiology and Hygiene	... 553
Biotechnology	... 557
Tissue Culture	... -
Food Additives	... 557
Cereals	... 557
Millet	... 562
Pulses	... 564
Oilseeds and Nuts	... 566
Tubers and Vegetables	... 569
Fruits	... 571
Confectionery, Starch and Sugar	... 572
Bakery products	... 573
Milk and Dairy products	... 576
Meat and Poultry	... 579
Seafoods	... 582
Protein Foods	... 583
Alcoholic and Non-alcoholic Beverages	... 584
Fats and oils	... 587
Spices and Condiments	... 588
Sensory Evaluation	... 589
Food Storage	... -
Infestation Control and Pesticides	... 590
Biochemistry and Nutrition	... 590
Toxicology	... 591
Food Laws and Regulations	... -
Author Index	... 593
Subject Index	... 599

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---

**CONTENTS**

---

	<b>Page No</b>
General	... 609
Food Processing	... 609
Food Packaging	... 609
Food Engineering and Equipment	... 609
Energy in Food Processing	... -
Food Chemistry and Analysis	... 610
Food Microbiology and Hygiene	... 612
Biotechnology	... -
Tissue Culture	... -
Food Additives	... 616
Cereals	... 617
Milletts	... 620
Pulses	... 622
Oilseeds and Nuts	... 626
Tubers and Vegetables	... 629
Fruits	... 632
Confectionery, Starch and Sugar	... 636
Bakery products	... 637
Milk and Dairy products	... 639
Meat and Poultry	... 644
Seafoods	... 651
Protein Foods	... -
Alcoholic and Non-alcoholic Beverages	... 656
Fats and oils	... 658
Spices and Condiments	... 661
Sensory Evaluation	... 663
Food Storage	... 664
Infestation Control and Pesticides	... 664
Biochemistry and Nutrition	... 665
Toxicology	... 665
Food Laws and Regulations	... 667
Author Index	... 677
Subject Index	

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1

Berry (SK). **Role of air in foods.** *Indian Food Industry* 11(2): 1992; 40-46

The functional role of air in selected food products (cereal-based food products, legume-based food products, sugar-based products, milk and fat-based products, egg products, meat products and puffed products) offered either as emulsion or foam prepared using traditional and modern processing techniques is highlighted. The production data and the nutritive value of some of the food products is also presented. CSA

2

Hildebrand (DF). **Altering fatty acid metabolism in plants.** *Food Technology* 46(4): 1992; 71-74

The progress and prospects of using biotechnology for improving fatty acid composition and the formation of fatty acid peroxidation products in plant-derived food components is reviewed in this article. 27 references. CSA

## FOOD PROCESSING

3

Olszyna-Marzys (AE). **Radioactivity and food preservation.** *Nutrition Reviews* 50(6): 1992; 162-165

The purpose, advantages, limitations had different methods of food irradiation; the types of foods that are benefitted by radioactive preservation; and the possible toxic side-effects are discussed in the paper. GS

## FOOD PACKAGING

4

Fuchs (M), Kluge (S), Ruter (M), Wolff (E) and Piringer (O). **Global migration determination and sensory evaluation of microwaveable material coming into contact with food (Part II).** *Deutsche Lebensmittel-Rundschau* 87(10): 1991; 311-316 (De)

During preparation and heating of food in microwave ovens temp. up to 150°C - also in the absence of susceptors - can occur dependent on the time of treatment, structure and fat content of food. Usually, the temp. hardly exceed 100°C. To

evaluate the quality of packages and containers for microwave use with regard to the overall migration, the total amount of substance transferred to the food simulant Tenax was determined by extraction with diethyl-ether and subsequent GC analysis of the extract and, in some cases, gravimetrically after evaporation of the solvent. The amount of transferred compounds obtained in this way was dependent on the type of plastic. Whereas, for plastics on the base of polyester and polysulphon, mass transfer was found to be mostly in the range of the detection limit of 0.1 mg/dm<sup>2</sup>, the corresponding values for polypropylene were found to be remarkably higher. The method described here allows a rapid and economic examination of packages and containers at higher temp. Possible sources of faults are taken into consideration and discussed. In principle, the method allows the identification of the migrated substances using suitable detectors. The results of the sensory evaluation indicated to some extent, but not a general correlation with the desorbed amounts. Furthermore, in contrast to the physical examinations, the sensory evaluation did not provide such a clear distinction between the different types of plastic. AA

5

Madhwaraj (MS), Satish (HS), Vijayendraro (AR) and Mahendrapandian (S). **Filling of retort pouch - a simple device to obtain clean seal area.** *Indian Food Industry* 11(2): 1992; 47-48

Describes a simple technique to eliminate contamination of seal area in flexible pouches due to spurting and accumulated drip as delivery nozzle comes in contact with the inner surface of the pouches while withdrawing. CSA

6

Grob (K), Artho (A), Biedermann (M), Caramaschi (A) and Mikle (H). **Batching oils on sisal bags used for packaging foods: Analysis of coupled LC/GC.** *Journal of AOAC International* 75(2): 1992; 283-287

Sisal fibres are treated with a batching oil before spinning. Such oils usually consist of mineral oil products and cause considerable contamination of the packed foods (typically 10 - 100 mg/kg). Batching oils recovered from sisal bags previously used for transporting cocoa and coffee beans were analyzed for total concn. on the bag as well as the composition of the paraffins and aromatics. Concn. of total hydrocarbons ranged between 0.3 and 39 g/kg sisal bag; concn. of aromatics ranged between < 0.1 and 2.7 g/kg. The applied batching oils varied between raw mineral oil fractions, somewhat purified fractions, and a crystallized product. AA



## Packaging materials

7

Trivedi (MK). **Speciality papers for packaging.** *Packaging India* 25(1): 1992: 5, 7, 9, 11

A brief discussion on some important papers used in packaging (tissue papers, printing paper, high gloss papers, cover papers, glassine and greaseproof papers, waxed papers, water proof papers, parchment paper, functional papers, wet strength paper, mould resistant papers, vapour phase inhibitor papers and laminations) and the principles involved in making them are dealt in this article. CSA

8

Vinh (PG), Alur (MD) and Nair (PM).  **$\gamma$ -radiation induced physical changes in Vietnam and Indian packaging materials.** *Packaging India* 25(1): 1992: 13-16

Physical properties such as force required to break (Newton) and elongation (%) of Vietnam and Indian packaging materials subjected to  $\gamma$ -radiation are compared. The results indicated that polyethylene pouches made in Vietnam were found to have a weak structure breaking with a force of 20N while Indian polyethylene of different gauges (560, 620 and 680) were quite strong requiring force not less than 30 - 40N. Irradiation improved certain physical parameters of Indian packaging material while Vietnam polyethylene showed loss of tensile property due to  $\gamma$ -radiation. However, Vietnam laminated paper polyethylene showed no change after irradiation suggesting its suitability for  $\gamma$ -ray sterilization which could be used to prevent contamination of flesh foods which required doses < 5 kGy. AA

## FOOD ENGINEERING AND EQUIPMENT

9

Kachru (RP) and Singh (HP). **Drying of agricultural products for minimizing post-harvest losses.** *Indian Farming* 42(1): 1992: 29-32

Rice and soybean, harvested at 20 - 25% (wb) moisture need to be dried to 10-12% (wb) for safe storage. Economic analysis of some selected crop driers for paddy, pearl millet, sorghum, groundnut, copra, coconut, black pepper, arecanut, cardamom, cocoa beans, wheat, shelled maize, pulses, pigeon pea, fish, papads is presented. SD

10

Krishnappa (KG) and Krishnalah (MM). **Pollution and control in roller flour milling industry.** *Indian Miller* 22(5): 1992: 15-18

Aspects covered in this article are: dust pollution, water pollution, water pollution treatments in roller flour mill and noise pollution (measurement of noise level, sources of noise in roller flour mill, noise control in roller flour milling, reduction of noise level in the mill). SRA

11

Ramesh (A). **Food processing plant and machinery - an overview.** *Indian Food Industry* 11(1): 1992: 20-26

An overview of the design of the food processing plant and machinery, the machinery needs of the food industry in India, special developments needed in some technology areas which include high speed specialised centrifugal separators; large capacity spray-drying and roller-drying plants; evaporation and aroma recovery plants; specialised energy efficient heat exchangers; aseptic processing and packaging equipment; special types of forming and cooking machinery; equipment based on emerging techniques like supercritical fluid extraction, cryogenics and membrane processing; latest types of freezing and freeze-drying equipment and system designs and a list of important machinery required for selected food processing industries is presented. CSA

12

Richardson (PS). **Product design for microwave reheating.** *Indian Food Industry* 11(2): 1992: 24-32

Electro-magnetic spectrum and fundamentals of microwave heating, energy distribution and its effect on temp. distribution in products, product design (component selection, product interactions, packaging considerations, performance testing, product test, production consideration) are described in this article. A case study to identify the effects of food component layout and packaging material (foil versus plastic) on the reheating characteristics of a standard, experimental, frozen ready-meal consisting of ground beef (130 g), processed peas (80 g) and mashed potato (102 g) was conducted. The results show that foil trays can be used successfully to achieve even heating and that for best results the heating rates of the components need to be matched. CSA



## Equipments

13

Schmidt (A). **Technical equipment for the intake of high quality grain.** *Getreide-Mehl und Brot* 45(9); 1991; 263-265 (De)

14

Jagadeesh (A). **Solar water pre-heater for cooking.** *Invention Intelligence* 28(3); 1992; 68-69

Design, operation and performance of a simple solar water pre-heater (Jagadeeshwar-II) for cooking is described. The pre-heated water using solar energy saves cooking fuel in rural areas and to many other applications, including hot water supply. BV

## ENERGY IN FOOD PROCESSING

Nil

## FOOD CHEMISTRY AND ANALYSIS

### Chemistry

15

Bradley (DG) and Min (DB). **Singlet oxygen oxidation of foods.** *CRC Critical Reviews in Food Science and Nutrition* 31(3); 1992; 211-236

This article reviews the basic information on the chemical properties, formation, and inhibition and detection of singlet oxygen oxidation as it relates to the oxidation of vegetable oils, dairy products and meats and other food components. Covers electron configuration of molecular oxygen, mechanism of photosensitized oxidation, effects of packaging materials on foods during light exposure, the role of singlet oxygen in oxidation in food, detn. of quenching mechanisms of singlet oxygen oxidation. 168 references. SRA

16

Whitfield (FB). **Volatiles from interactions of Maillard reactions and lipids.** *CRC Critical Reviews in Food Science and Nutrition* 31(1/2); 1992; 1-58

This article provides current information on the production of volatile compounds from interactions of Maillard reactions and lipids. It includes the Maillard reactions, the strecker degradation of amino acids and the oxidation of lipids. Compounds derived from these reactions that could interact to form volatile flavour components during the

processing or cooking of food is highlighted. Results from model systems involving interactions between Maillard reaction products and carbonyl compounds, amino acids and carbonyl compounds, amino acids and derivatives of fatty acids, and Maillard reaction products, triglycerides and phospholipids are discussed. The qualitative and quantitative effects of triglycerides and phospholipids on the formation of volatile Maillard products having long-chain alkyl heterocyclic compounds, methods for their formation, their aromas, the role of these compounds in cooked foods (meat and beverages) are also covered. 117 references. SRA

17

Cairns (T) and Siegmund (EG). **Confirmation of trace level residues in the food supply.** *CRC Critical Reviews in Food Science and Nutrition* 30(4); 1991; 397-402

The emphasis of this review is on the experimental process of confirmation at concn. levels in the range of p.p.m. to p.p.t. At such levels, various data manipulations or alternate choices of approaching the analytical problem of confirmation must be employed to ensure an acceptable result. The problems experienced when dealing with nanogram levels in analysis are much more complex than when recording mass spectrum of an ample supply of a reference standard. An interpretation of the developing status of the confirmation since there does not yet exist "accepted criteria". 10 references. SRA

18

Chauhan (GS), Eskin (NAM) and Tkachuk (R). **Nutrients and antinutrients in quinoa seed.** *Cereal Chemistry* 69(1); 1992; 85-88

Quinoa seeds, manually and water dehulled, were ground into meal and milled into bran and flour. The protein content of the whole seed was 13.7%, with bran, flour, and hulls accounting for 65, 28 - 30, and 7% of the total protein, respectively. Seeds prepared by manual dehulling were all higher in lysine and sulphur amino acids, which are typical of legumes and cereals. Mineral analysis showed that quinoa seed fractions were all rich in Ca, P and Fe. Examination of antinutrients indicated very little trypsin inhibitor activity. The saponin content was quite low in the quinoa var. examined, with 34% located in the hulls. Although manual dehulling reduced the saponin content, a further reduction in saponin was obtained by water extraction. AA

## Chemistry (Analytical)

19

Gromes (R), Glaser (D), Sattig (B) and Schnellbacher (B). **Determination of nitrate levels in foodstuffs using HPLC and a new enzymatic assay.** *Deutsche Lebensmittel-Rundschau* 87(11); 1991; 346-350 (De)

The nitrate levels in different foodstuffs were investigated with 2 methods. The results obtained with nitrate standard solutions from HPLC and the enzymatic method were comparable. After the same sample preparation nitrate was determined in wine, juices, vegetables and herbs. In the range of 5 - 80 mg/l nitrate the results obtained with both methods were reproducible and comparable. Below 5 mg/l nitrate the enzymatic method lead to better reproducible results. AA

20

Seifert (A), Strenge (K), Schultz (M) and Schmandke (H). **Determination of stability of food emulsions. Part 1. The influence of the type and concentration of protein on creaming stability determined by analytical ultracentrifugation.** *Die Nahrung* 35(9); 1991; 989-998

21

Lanher (BS). **Quantitative analysis of agricultural and food products: A new instrumental and computerized approach.** *Journal of AOAC International* 75(1); 1992; 18-25

A new software package, ANAQUANT, was specifically designed for a long-term approach to the quantitation of compounds in biological products. Its functionality and validity were tested by measuring fat and protein contents in liquid cow's milk using Fourier transform infrared spectrometry and a handcrafted transmission flow cell. Calibration and validation standard deviations were 0.2484 and 0.3987 g/kg, respectively, for the prediction of proteins, and 0.3163 and 0.4222 g/L, respectively, for the prediction of butterfat. One month elapsed between calibration of the instrument and the validation study. Results are consistent with those proposed in the literature. AA

22

Ulberth (F) and Henninger (M). **One-step extraction/methylation method for determining the fatty acid composition of processed foods.** *Journal of the American Oil Chemist's Society* 69(2); 1992; 174-177

In a one-step extraction/methylation (OSM) method for determining individual fatty acids (FA) in processed food products, freeze-dried samples,

containing 10-50 mg fat, were transmethylated without prior fat extraction with a mixture of methanol-HCl/toluene. After washing the organic phase the formed FA methyl esters were ready for separation by gas-liquid chromatography (GLC). The relative standard deviation for total FA content was < 3.5%, regardless of the food type analyzed. Furthermore, the FA composition of selected fatty foods as obtained by the OSM procedure was almost identical with the FA composition of the pure fats extracted by the Soxhlet procedure and with chloroform-methanol, respectively. The OSM method is inexpensive and simple to perform and is, therefore, well suited for nutrient labeling studies, especially in situations where many samples have to be analyzed for their total FA content. AA

23

Miller-Ihli (NJ) and Greene (FE). **Graphite furnace atomic absorption method for the determination of chromium in foods and biological materials.** *Journal of AOAC International* 75(2); 1992; 345-359

A method was developed for the detn. of chromium in food samples and other biological materials. Samples are dry ashed in a muffle furnace and are analyzed by graphite furnace atomic absorption spectrometry. Magnesium nitrate is used as a matrix modifier, and samples are quantitated by platform atomization and peak area measurements with direct calibration against aqueous standards. The detection limit (based on 3.29  $\sigma$ ) was 5.6 pg, or 0.28  $\mu\text{g/L}$  for a 20  $\mu\text{L}$  injection. The characteristic mass was 3.2 pg. This method was validated by analyzing a range of reference materials and was subsequently used for the analysis of a var. of food samples. A comparison of analytical results obtained from direct calibration and method of additions was made. AA

24

Prosky (L), Asp (N-G), Schweizer (TF), DeVries (JW) and Furda (I). **Determination of insoluble and soluble dietary fiber in foods and food products: Collaborative study.** *Journal of AOAC International* 75(2); 1992; 360-367

25

Li (BW) and Cardozo (MS). **Nonenzymatic-gravimetric determination of total dietary fiber in fruits and vegetables.** *Journal of AOAC International* 75(2); 1992; 372-374

Most gravimetric methods for total dietary fiber (TDF) detn. require the complete removal of starch and the partial removal of protein with various combination of enzymes in buffers at different pH values and at temp. much above ambient condition. A hydrolysis step is crucial in dietary fiber analysis



of samples, such as cereals and legumes, which contain appreciable amounts of starch. However, many vegetables and most fruits contain very little or no starch, and they are often eaten uncooked. It would be unnecessary to use high temp. and enzymes on these types of samples. Initially, it was found that hexane and dilute alcohol extractions of a few selected fruits and vegetables gave residue wts. comparable to those after enzymatic treatments. It was able to show later that simply suspending the samples in deionized water for 90 min at 37°C and then adding 95% ethanol also yields TDF values similar to those obtained from other published methods. Comparison data obtained by using variations of the AOAC/TDF method are presented for 10 fruits and vegetables. AA

26

Abdel-Kader (ZM). **Comparison of AOAC and high-performance liquid chromatographic methods for thiamin determination in foods.** *Food Chemistry* 43(5): 1992: 393-397

Thiamin determined by a rapid, sensitive, accurate and economical HPLC assay in whole milk, skim milk powder, Cheddar cheese, raw pea, boiled potatoes, enriched wheat flour, noodles, rice, corn flake and orange compared well with the AOAC method. SD

27

Kemsley (EK), Zhuo (L), Hammouri (MK) and Wilson (RH). **Quantitative analysis of sugar solutions using infrared spectroscopy.** *Food Chemistry* 44(4): 1992: 299-304

Fourier Transform Infrared spectroscopy in the mid-infrared (4000 - 400  $\text{cm}^{-1}$ ) showed potential for on-line monitoring being rapid. The calibrations for mixtures of sucrose, glucose and fructose obtained by matrix methods, were applied to real and synthetic samples and compared with those obtained from traditional methods. SD

28

Razagui (IB) and Barlow (PJ). **A chemical clean-up procedure to reduce trace metal contamination from laboratory blenders.** *Food Chemistry* 44(4): 1992: 309-312

A simple and economical method is described for minimising adventitious contamination from lab. blender prior to their use for the homogenisation of food samples that are to be analysed for mineral content. The blenders are treated with a hot aqueous solution of a mixture of 2% EDTA and 2% citric acid. The solution is allowed to mix in the blender at medium speed for 5 min before the bowls of the blenders are rinsed and the treatment

repeated for a second time. The clean-up procedure minimises contamination for Fe, Zn, Cu, Pb, Cd and Cr. SD

29

Wada (E), Mizutani (H) and Minagawa (M). **The use of stable isotopes for food web analysis.** *CRC Critical Reviews in Food Science and Nutrition* 30(4): 1991: 361-371

The use of stable isotope ratio patterns of nitrogen and carbon to study food webs of a variety of ecosystems, such as estuaries, the Antarctic ocean, seabird rookeries, and humans is demonstrated in this article. Examples of the fluctuations of these elemental isotope ratios are reviewed in light of underlying food habits of the ecosystem's inhabitants. The results demonstrate the overall usefulness of the stable isotope approach to food web analysis. 17 references. SRA

## FOOD MICROBIOLOGY AND HYGIENE

30

Garcia de Fernando (GD), Diaz (O), Fernandez (M) and Ordonez (JA). **Changes in water activity of selected solid culture media throughout incubation.** *Food Microbiology* 9(1): 1992: 77-82

The  $a_w$  of selected culture media commonly used in food microbiology have been determined and the effects of the vol. of medium poured in Petri dishes, temp. and time of incubation on  $a_w$  reduction studied. The  $a_w$  values consistently fell throughout incubation. However, in culture media with  $a_w > 0.94$ , the reduction of  $a_w$  was negligible for microbial growth at incubation temp.  $< 32^\circ\text{C}$ . Nevertheless, the  $a_w$  reductions at higher temp. may retard microbial growth. In media with  $a_w$  between 0.88 and 0.94, the  $a_w$  decreased sufficiently to adversely affect the growth of microorganisms on these media. The relationships between the  $a_w$  of the media and microbial growth on them are discussed. AA

31

Jay (JM). **Microbiological food safety.** *CRC Critical Reviews in Food Science and Nutrition* 31(3): 1992: 177-190

The present state of our knowledge of foodborne pathogens, including the incidence of foodborne diseases, the factors that contribute to them, the newer processing technologies and the potential they present relative to foodborne illnesses are reviewed in this article. Other aspects covered are the approaches to food safety taken by the food



industry, hard data are cited where they exist along with sources. 24 references. SRA

## Enzymes

32

Abraham (TE), Jamuna (R), Bansilal (CV) and Ramakrishna (SV). **Continuous synthesis of glucoamylase by immobilized fungal mycelium of *Aspergillus niger***. *Starch/Starke* 43(3): 1991; 113-116

The extracellular glucoamylase enzyme (EC 3.2.1.3) was synthesized continuously by the immobilized mycelial fragments of *A. niger*. Of the several polymeric matrices attempted for immobilization k-carrageenan and alginate were found to be the most effective. However, the enzyme activity exhibited by the immobilized mycelia (I.M.) was 15-20% lower than that of free cells under batch conditions. The immobilized cells have retained nearly the same enzymatic activity (120IU/g) of I.M.) for 6 repeated batches and thereafter decline in activity was noticed. An aerated packed bed reactor with I.M. was operated continuously for 360 h. The volumetric productivity of the reactor was 1600IU/L/h for 192 h and reduced to 25% in 360 h. AA

## Microorganisms

### Bacteria

33

Doyle (MP). **A new generation of foodborne pathogens**. *Dairy, Food and Environmental Sanitation* 12(8): 1992; 490, 492-493

This review focusses pathogens (*Campylobacter jejuni*, *Yersinia enterocolitica*, *Vibrio vulnificus*, *Listeria monocytogenes*, *Enterohemorrhagic Escherichia coli* 0157:H7, *Salmonella enteritidis*) that recently have been recognized as important causes of foodborne disease. 22 references. SRA

### Aeromonas

34

Gram (L). **Inhibition of mesophilic spoilage *Aeromonas* spp. on fish by salt, potassium sorbate, liquid smoke, and chilling**. *Journal of Food Protection* 54(6): 1991; 436-442

The purpose of the present study has been to develop simple fish preservation techniques applicable at artisanal level in developing countries in the tropical zone. Mesophilic motile *Aeromonas* spp. which were

classified as specific spoilage bacteria of Nile perch (*Lates niloticus*) from Lake Victoria stored at ambient temp. were inhibited in lab. model systems using NaCl, potassium sorbate, and liquid smoke. Growth was not detected when the salt concn. exceeded 5% or the temp. was below 5°C. At 25 - 37°C growth occurred within 24 h when no preservation was applied, but a combination of 5% salt and 1000 p.p.m. sorbate inhibited growth at 25 - 37°C. Liquid smoke inhibited growth at 37°C only when an initial low inoculum ( $10^2$  CFU/ml) was used. Based on the model exp., trials were carried out in Kenya and a lightly preserved fish product stable at ambient temp. was developed. The addition of 1.5% salt (w/w) and 1500 p.p.m. sorbate (w/w) followed by 3 days of sun-drying resulted in a lightly brown, well preserved fish product which could be produced at artisanal level and was palatable to local consumers. Good agreement was seen between results from model exp. and trials with fish. AA

### *Aeromonas hydrophila*

35

Palumbo (SA), Williams (AC), Buchanan (RL) and Phillips (JG). **Model for the aerobic growth of *Aeromonas hydrophila* K144**. *Journal of Food Protection* 54(6): 1991; 429-435

The combined effects of temp. (5 and 42°C), NaCl (0.5 to 4.5%), pH (5.3 to 7.3),  $\text{NaNO}_2$  (0 to 200 µg/ml) on the aerobic growth of *aeromonas hydrophila* K144 were studied in brain heart infusion (BHI) broth using a modified central composite design. Variable combinations were tested in triplicate aerobic flasks; viable cell counts were made at intervals during incubation by surface plating on tryptic soy agar. Growth curves were generated using the Gompertz equation in conjunction with a nonlinear iterative regression analysis. Values for the 4 Gompertz parameters (A, C, B and M) were obtained for the variable combinations tested. Using response surface techniques, quadratic and cubic equations containing the 4 variables of temp., pH, NaCl, and  $\text{NaNO}_2$  were developed to yield predictive values for the B and M Gompertz values. Goodness of fit evaluation of the models was by  $R^2$  values. Comparison of predicted and observed values of B and M and evaluation of predicted lag times and generation times indicated that the quadratic model gave a better fit. Overall, the variable combinations interacted to decrease the generation time and increase the lag time. The results indicate that pH, salt and nitrite can decrease the growth of *A. hydrophila* when combined with low temp. incubation. AA



Jamuna (R), Bindu (C) and Ramakrishna (SV). **Synthesis of thermostable  $\alpha$ -amylase by *Bacillus* isolate R-8.** *Starch/Starke* 43(1); 1991: 28-32

An indigenous isolate *Bacillus* R-8 was found to produce thermostable  $\alpha$ -amylase. The enzyme yield was highest during the stationary phase of the culture. Max. production of 100 units per ml was achieved in the maltose medium and also in the alkaline conditions of fermentation. It has been observed that the rate of enzyme formation was highest (2.8 units/g of cells/h) with glucose under neutral conditions. The variations in the fermentation parameters which have resulted in the significant difference in terms of total enzyme production and the rate of enzyme formation have been discussed. AA

#### *Leuconostoc oenos*

Krieger (SA), Hammes (WP) and Henick-Kling (T). **Effect of medium composition on growth rate, growth yield and malolactic activity of *Leuconostoc oenos* LoZH<sub>1</sub>-t<sub>7</sub>-1.** *Food Microbiology* 9(1); 1992: 1-11

A new synthetic medium (pH 4.5) for the preparation of starter cultures and to quantify the effect of various amounts of glucose, fructose and malate on growth rate, cell yield, and malolactic activity of a selected strain of *Leuconostoc oenos* was studied. All cultures were incubated at 25°C. Samples were drawn at every 12 h over 4 days. The number of viable cells was determined at 72 or 96 h. Results indicated that the growth rate and yield were highest in media containing fructose as carbohydrate source. Max. cell density was reached in media containing fructose after 36 h, compared to 144 h in media containing glucose. Cell yields in fructose media were 160 - 200% higher than glucose media. Molar growth yield was the same for glucose and fructose and with and without L-malate. Results revealed that, best growth rate, cell yield and malolactic activity could be obtained in fructose media as main carbohydrate source with added glucose and L-malate. SRA

#### *Listeria monocytogenes*

Rossen (L), Holmstrom (K), Olsen (JE) and Rasmussen (OF). **A rapid polymerase chain reaction (PCR)-based assay for the identification of *Listeria monocytogenes* in food samples.**

A rapid and simple assay has been developed which allows specific detection of *L. monocytogenes* within 3.5 h in cultures prepared from suspect food samples and propagated 48 h in selective medium. The assay is based on PCR technology, and uses a specific primer set derived from sequences located down-stream of the *hlyA* gene. The specificity of the primer set was confirmed by testing 115 *L. monocytogenes*, 14 *L. innocua*, 5 *L. seeligeri* and 4 *L. ivanovii* isolates. The assay was compared to standard microbiological tests and gave identical results for 83 food samples, including 32 positives. These field trials indicate that the assay developed provides an alternative detection system for *L. monocytogenes* in foods, which can be used by the food industry. AA

Westoo (A) and Peterz (M). **Evaluation of methods for detection of *Listeria monocytogenes* in foods: NMKL collaborative study.** *Journal of AOAC International* 75(1); 1992: 46-52

Blue and white mold cheese and canned corned beef, were inoculated with 3 levels of *L. monocytogenes*. Beef was also inoculated with a microbial flora derived from raw meat. The recoveries of *L. monocytogenes* using USDA method, Food safety and inspection service method for dairy products did not differ significantly. The Oxford agar was superior to the lithium chloride phenylethanol-moxalactam agar. KOH treatment of the enriched culture did not significantly increase the detection rate of the organism. For cheese the detection level of the methods was below 0.2 cfu *L. monocytogenes*/g, and for meat, the detection level was below 5 cfu *L. monocytogenes*/g. BV

Saguy (I). **Simulated growth of *Listeria monocytogenes* in refrigerated foods stored at variable temperatures.** *Food Technology* 46(3); 1992: 69-71

The objective of this study was to simulate mathematically several possible distribution and storage scenarios and to assess the potential growth of *Listeria monocytogenes* in refrigerated minimally processed foods. The results of the study demonstrate the necessity of controlling storage temp. of ready-to-eat minimally processed foods throughout the product life cycle from production to actual consumption, the need for appropriate Hazard Analysis Critical Control Point and microbial inhibitor factors to guarantee product safety when temp. fluctuations are expected. CSA



## **Shigella flexneri**

41

Zaika (LL), Kim (AH) and Ford (L). **Effect of sodium nitrite on growth of *Shigella flexneri***. *Journal of Food Protection* 54(6): 1991: 424-428

A partial factorial design study of the effect of  $\text{NaNO}_2$  (0, 100, 200, 1000 p.p.m.) in combination with NaCl (0.5, 2.5, 4.0%), pH (7.5, 6.5, 5.5), and temp. (37, 28, 19°C) on growth of *Shigella flexneri* is reported. Exp. were done aerobically in brain-heart infusion medium, using an inoculum of  $1 \times 10^3$  CFU/ml. Growth curves were fitted from plate count data by the Gompertz equation; exponential growth rates, lag times, generation times, and max. populations were derived for all variable combinations. In the absence of nitrite, the organism grew well under all test conditions at 37 and 28°C but did not grow at 19°C at pH 5.5 nor at pH 7.5 with 4% NaCl. Nitrite did not affect growth in media of pH 7.5 at 37 and 28°C. At pH 6.5 growth was inhibited by 1000 p.p.m.  $\text{NaNO}_2$ . The organism failed to grow at 19°C at all nitrite levels in the presence of 2.5 or 4.0% NaCl. The inhibitory effect of nitrite was much greater in media of pH 5.5 and increased with increasing salt levels. More inhibition was apparent at 28 than at 37°C. While lack of growth was used as a paradigm of the effect of nitrite on *S. flexneri*, nitrite also increased the lag and generation times and decreased the exponential growth rate. Results indicated that  $\text{NaNO}_2$  in combinations with low temp, low pH, and high salt content can effectively inhibit the growth of *S. flexneri* AA

## **Fungi**

42

Beuchat (LR), Nail (BV), Brackett (RE) and Fox (TL). **Comparison of the petrifilm™ yeast and mold culture film method to conventional methods for enumerating yeasts and molds in foods.** *Journal of Food Protection* 54(6): 1991: 443-447

Petrifilm™ Yeast and Mold (YM) plates were compared to acidified potato dextrose agar (APDA) and chloramphenicol-supplemented plate count agar (CPCA) for its suitability to enumerate yeasts and molds in 13 groups of food products. These products consisted of beans (dry and frozen, green), corn meal, flour (wheat), fruit (apple), a meat/vegetable entree (chicken pot pie), a precooked meat (beef), milk (dehydrated, nonfat), nuts (pecans), pasta, potatoes (dehydrated), precooked sausage, and a spice (black pepper). Correlation coeff. of Petrifilm™ YM plates versus APDA and CPCA pour plates for recovering total yeasts and molds from a composite of the 13 test foods were,

respectively, 0.961 and 0.974. Individually, Petrifilm™ YM plate counts were equivalent or higher than APDA and CPCA for some food groups and lower for other food groups. Because food particle interference can make enumeration of yeast and mold colonies on Petrifilm™ YM plates difficult for some food groups, potential food interference will need to be evaluated for each food group tested. AA

## **Aspergillus**

43

Sardjono, Rahayu (K) and Sudarmadji (S). **Growth and aflatoxin production by *Aspergillus flavus* in mixed culture with *Aspergillus oryzae***. *ASEAN Food Journal* 7(1): 1992: 30-33

Production of aflatoxin by *Asp. flavus* was significantly reduced during mixed culture with *Asp. oryzae*. Aflatoxin B1 present in the spent culture medium of *Asp. flavus* was deactivated by the subsequent growth of *Asp. oryzae*. This study indicates natural control of aflatoxin production or accumulation during soy sauce or kecap fermentation and emphasizes the need for rapid and dominant growth of *Asp. oryzae* during these fermentations. SRA

## **Yeasts**

### **Saccharomyces cerevisiae**

44

Nagarajan (L) and Umesh-Kumar (S). **Antigenic studies on flocculating brewer's yeast, *Saccharomyces cerevisiae* NCYC 227**. *Journal of General Microbiology* 136(9): 1990: 1747-1751

Batch cultures of a brewer's strain of *Sacch. cerevisiae*, NCYC 227, in a defined medium exhibited characteristic flocculation during the late exponential phase of growth. However, early exponential cells were non-flocculent and flocculation of such cells could not be induced even in the presence of  $\text{Ca}^{2+}$ . A specific glycoprotein, absent from the cell walls of non-flocculating exponentially growing cells of this yeast and those of non-flocculating strains of *Sacch. cerevisiae*, was identified on the cell wall surface of flocculating exponentially growing cells of *Sacch. cerevisiae* NCYC 227. Flocculent cells of *S. cerevisiae* NCYC 227 dispersed with EDTA and coated with monovalent Fab portions of the antibody showed reduced flocculation. Removal of the monovalent antibody portions from the cell surfaces induced cell flocculation in the presence of  $\text{Ca}^{2+}$ . These results suggest a role for this glycoprotein in yeast cell flocculation. AA



## BIOTECHNOLOGY

45

Suvendu Bhattacharya. **Extruder as a bioreactor.** *Indian Food Industry* 11(1): 1992: 27-30

The use of an extruder as a bioreactor in the chemical and/or biochemical modification of food ingredients to create unique, new or improved properties is highlighted. Aspects covered are: the bioconversions through extrusion, liquefaction of starch, ethanol production and application of enzymes in food extrusion processes. CSA

46

Desai (NB), Dave (RI) and Thakar (PN). **Biotechnological approaches in dairy and food industries.** *Indian Food Industry* 11(2): 1992: 33-35, 39

Immobilization of cells and enzymes, genetic modifications, bacterial recombination processes (genetic engineering vis-a-vis dairy lactic acid bacteria, enzymes, modifications of proteins) and areas of biotechnological application are the aspects covered in this article. BV

47

Campanella (L), Cordatore (M), Mazzei (F), Tomassetti (M) and Volpe (G). **Phosphate determination in foodstuffs using a plant tissue electrode.** *Food Chemistry* 44(4): 1992: 291-297

The electrode was developed by addition of glucose oxidase to a slice of *Solanum tuberosum* containing the acid phosphatase enzyme and using an amperometric (Clark) electrode as indicating sensor. The phosphate determined in authentic matrices such as fresh and powdered milk, wine and tomato puree were compared with those obtained using Bartlett's spectrometric method. SD

48

Pariza (MW). **Foods of new biotechnology vs traditional products: Microbiological aspects.** *Food Technology* 46(3): 1992: 100-102

Aspects discussed in this article are the microbiological safety of new vs traditional foods; an approach to determining the safety of new foods and ingredients derived from engineered microorganisms; and the prospects for novel uses of microorganisms to further protect the food supply. CSA

49

Stewart (KK). **Food composition and analysis in the assessment of the safety of food produced by biotechnology.** *Food Technology* 46(3): 1992: 103-107

The article focusses on the problems related to the toxins produced naturally by plants and those of environmental origin that are concentrated by plants, as well as the safety assessment of plant foods produced and/or processed by biotechnology. CSA

## TISSUE CULTURE

Nil

## FOOD ADDITIVES

### Antimicrobials

50

McKellar (RC), Paquet (A) and Ma (C-Y). **Antimicrobial activity of fatty N-acylamino acids against gram-positive foodborne pathogens.** *Food Microbiology* 9(1): 1992: 67-76

This study showed that myristoyl (C<sub>14</sub>) derivatives gave the greatest antimicrobial activity, followed by lauroyl (C<sub>12</sub>) and palmitoyl (C<sub>16</sub>). Phenylalanine (derivative of aromatic amino acid) was most active. The min. inhibitory concn. (8.5 µgml<sup>-1</sup>) was obtained with the myristoyl-phenylalanine. Inhibitory activity was highest under mildly acidic (pH 6.0) condition. Fatty N-acylamino acids inhibited production of hemolysin by *Listeria monocytogenes*. The results suggest that fatty N-acylamino acids may have some potential use as multi-functional food additives. SRA

### Flavourings

51

Burdock (GA) and Ford (RA). **Safety evaluation of dibenzyl ether.** *Food and Chemical Toxicology* 30(7): 1992: 559-566

Dibenzyl ether (FEMA No. 2371, CAS No. 103 50-4) was given in the diet to rats at a rate of 62, 196 or 620 mg/kg/day for 91 consecutive days. Body wts and food consumption were measured weekly; haematological, clinical chemistry and urinalysis values were obtained at wk 6 and 12. Gross and microscopic pathological changes were observed and organ wts recorded. The high-dose females had



increased absolute and relative liver wts: this was considered to be related to dose. Other statistically significant events that occurred sporadically within the test groups were unrelated to dose and were considered to be normal adaptive change. No toxicological or pathological effects were noted at any of the dose levels after 91 consecutive days of feeding dibenzyl ether. A no-effect level was achieved at 196 mg/kg/day. In a 60-kg human, this would be equivalent to approx. 11.8 g/day, assuming a direct relationship between dose and body wt. across species. Based on the possible av. daily intake of 19.2 mg/day, this would confer a safety factor of 600. The safety factor based on the more realistic consumption *per capita* of 23.6 µg/day would be approx. 500,000. AA

## Stabilizers

## Gums

52

Mukherjee (A), Agarwal (K) and Chakrabarti (J). **Genotoxicity studies of the food additive ester gum.** *Food and Chemical Toxicology* 30(7): 1992: 627-630

Oral administration of ester gum (EG, glycerol ester of wood rosin acids and chemically known as glycerol triacetate) at doses 50, 100 and 150 mg/kg body wt. to male Swiss albino mice did not induce any significant sister chromatid exchange and chromosomal aberration. The aberrations were mainly of the chromatid type. The clastogenicity was marginal and statistically significant for one sampling time (6 h) and only for the doses of 100 and 150 mg EG/kg body wt. BV

## CEREALS

53

Rybka (K), Boros (D) and Raczynska-Bojanowska (K). **Comparative studies on the components of cereal grain that are undigestible *in vitro*.** *Journal of Cereal Science* 15(3): 1992: 295-303

The protein contents of the combined enzyme-extractable and enzyme-unextractable fractions in the procedure of Asp et al ranged from 17% in wheat to 27% in barley; 20 - 25% of the undigestible protein was found in the extractable fraction. The interspecies variability in the cereal grain components that were undigestible *in vitro* was due primarily to the enzyme-extractable fraction. The differences involved: (i) the amounts of saccharides solubilized during the digestion procedure (from 27 mg/g grain meal in wheat to 38

mg/g in rye); (ii) the saccharide/protein ratios (ranging from 7 in rye and triticale to 5 in wheat and barley); and (iii) the compositions of both polysaccharides and protein. Arabinose and xylose in the rye enzyme-extractable fraction comprised 80% of the total undigested polysaccharide, and for wheat and barley these values were 55% and 30%, respectively. The content of protein-bound basic amino acids in this fraction was also higher in rye than in other cereals. Variation was less among the enzyme-unextractable fractions. It appears that the content and composition of the enzyme-extractable fraction may influence the nutritive value of cereal grain significantly. Carbohydrate-protein conjugates in this fraction may also have an important effect. AA

54

Kazemie (M) and Bushuk (W). **Use of lithium chloride for the extraction of flour proteins.** *Cereal Chemistry* 69(1): 1992: 105-107

In this study, 2M lithium chloride (LiCl) appeared to be more effective than 70% ethanol sol. for extracting gliadins from wheat flour. In addition, it was found that after extraction with solvents containing LiCl and urea or acetic acid and urea, a group of low mol. wt. proteins (possibly reprecipitated gliadins) together with gelatinized starch could be removed from residue by gently dispersion in double-distilled water. The protein in final residue appeared to be glutenin. AA

## Oats

55

Luikkonen (KH), Montfoort (A) and Laakso (SV). **Water-induced lipid changes in oat processing.** *Journal of Agricultural and Food Chemistry* 40(1): 1992: 126-130

Oat flours prepared from hulled, dehulled, or heat-treated grains were studied for lipid changes in aqueous suspensions. These data were compared to lipid profiles of fiber, protein, and starch fractions obtained in a wet fractionation process. The appearance of free fatty acids (FFA) at the expense of triglycerides (TG) but not their rapid oxidation was a response to water soaking of the flours; the lipids of hulled and dehulled grains were neither hydrolyzed nor oxidized under similar conditions. Wet fractionation of oat flour from nonheated grains resulted in TG hydrolysis in starch and protein fractions so that FFA content rose to 21% and 30%, respectively, while the lipids of fiber remained very similar to that of whole grains. Since TG, polar lipid, and FFA fractions in whole grains comprised about 78%, 19% and 3% of total lipids, very little of the oat's original lipid composition prevailed in the



starch and protein fractions. Therefore, prevention of lipid hydrolysis rather than oxidation should be a primary goal in the manufacture of nondeteriorated oat products. AA

56

Wood (PJ). **From oats to oat bran: Enrichment in  $\beta$ -glucan and potential nutritional benefits.** *Getreide-Mehl und Brot* 45(11); 1991; 327-331 (De)

57

Anon. **Efficacy of oat bran as a hypocholesterolemic agent.** *Nutrition Reviews* 48(7); 1990; 282-285

Addition of either high-fiber or low-fiber supplements to an ad-libitum diet resulted in equivocal reductions in plasma cholesterol in normocholesterolemic men and women. AA

## Rice

58

Andrews (SB), Siebenmorgen (TJ) and Mauromoustakos (A). **Evaluation of the McGill no. 2 rice miller.** *Cereal Chemistry* 69(1); 1992; 35-43

The effects of moisture content (MC), milling time, pressure applied to rice, and sample size on head rice yield and degree of milling were evaluated with the McGill No. 2 miller. MC was 9 - 14% (wb), milling time was 0 - 60 sec (in 15-sec intervals), and sample sizes were 100, 125, and 150 g of rough rice. The pressure applied to the rice was adjusted by varying the position of a 1.5-kg wt. on the wt. lever. Samples produced by milling at the experimental combinations were graded by the Federal Grain Inspection Service. MC was found to be the most significant variable and sample size the least significant variable in affecting head rice yield (HRY). When MC was decreased or sample size was increased, HRY increased. It was also determined that when milling time or pressure applied to the rice was increased, HRY decreased. HRYs obtained with the No. 2 miller were compared to yields obtained with the McGill No. 3 miller at corresponding MCs. It may be possible to obtain equivalent results with the proper settings. However, no one combination was found to produce equivalent results across all 4 MCs for both var. AA

## Brown rice

59

Champagne (ET), Hron (RJSr) and Abraham (G). **Utilizing ethanol to produce stabilized brown rice products.** *Journal of the American Oil Chemists Society* 69(3); 1992; 205-208

This paper discusses lipolytic hydrolysis and oxidation of kernel oil and methods for stabilizing the oil. An overview of processes in which ethanol is used in liquid and vapour states to stabilize brown rice to lipolytic hydrolysis is presented. BV

## Rice bran

60

Tashiro (M) and Maki (Z). **Effects of dietary rice bran trypsin inhibitor on the growth and pancreatic weights of rats.** *Nutrition Research* 10(11); 1990; 1325-1330

Male weanling rats were fed a 11.5% casein basal diet or the casein diets containing rice bran trypsin inhibitor (RBTI) at levels of 1.0, 2.0 and 4.0 g/kg diet for 3 wks, and the response of rats to dietary RBTI was examined. Results showed that the body wt. gain and food efficiency of the 0.4% RBTI diet group were significantly lower than those of the basal diet group at 1 wk, but these differences disappeared at 2 wk. Apparent nitrogen digestibility was also lower in the 0.4% RBTI diet group than in the basal when measured on days 3 and 4 after the start of the trial. Concerning pancreas, a significant increase in the wt. was observed in rats given diets containing 0.2% and 0.4% RBTI as compared to rats fed the basal diet, and the levels of trypsin and chymotrypsin activities tended to be higher in the RBTI diet groups than in the basal. These findings indicate that RBTI diets groups than in the basal. These findings indicate that RBTI diet consumption in weanling rats elicits physiological responses such as growth retardation and pancreatic enlargement. However, the deleterious effects of dietary RBTI seem to be ignored when the ingested level of RBTI is low under the conditions used in this study. AA

## Wheat

61

Mahoney (RR) and Ramsay (M). **A rapid tyrosinase test for detecting contamination of durum wheat.** *Journal of Cereal Science* 15(3); 1992; 267-270

A tyrosinase test has been developed for detecting contamination of durum wheat by breadwheat (*T. aestivum*) cvs. Soaking the wheat seeds in tyrosinate solution and exposure to air leads to rapid darkening of the grain from *aestivum* cvs, which can then be distinguished readily from the durum wheat in 30 min or less. The substrate is non-toxic and safe to handle. The test will differentiate both hard and soft *aestivum* cvs from durum, and is suitable for use in quality control at the point of intake. AA



Crosbie (GB), Lambe (WJ), Tsutsui (H) and Gilmour (RF). **Further evaluation of the flour swelling volume test for identifying wheats potentially suitable for Japanese noodles.** *Journal of Cereal Science* 15(3): 1992: 271-280

The aim of this study was to further evaluate the flour swelling vol. test for rapidly identifying wheat breeding lines with grain quality potential for manufacturing white Japanese noodles. Certain improvements to the test are described, which improve the ease of measurement and increase sample throughput. The test was applied to flour milled to 60% extraction on a Buhler mill, flour from a Quadrumat Junior micromill and to wholemeal flour, using the grain of 16 cvs grown at two location in Western Australia. The swelling vol. of each type of flour was significantly ( $P < 0.01$ ) correlated with total texture score and its components, namely balance of softness and hardness, elasticity and smoothness. Although some indication of non-linearity in these relationships is apparent, the test can clearly distinguish between high- and low-quality samples. The test is simple, rapid, safe and inexpensive, and is ideal for identifying those early generation lines in a wheat breeding programme that have potential for manufacturing white Japanese noodles. Used in its simplest form, test samples are rated in comparison with reference cv, on the basis of a quick inspection of gel height. AA

Brummer (J-M) and Seibel (W). **Baking quality of wheat from extensive ("low input") production.** *Getreide-Mehl und Brot* 45(11): 1991: 336-341 (De)

Sekhon (KS), Narpinder Singh and Pal Singh (R). **Studies on the improvement of quality of wheat infected with Karnal Bunt. I. Milling, rheological, and baking properties.** *Cereal Chemistry* 69(1): 1992: 50-54

Studies were conducted with a view to developing treatments to overcome the adverse effects of Karnal bunt (*Neovossia indica*) disease on the quality of wheat and its products. Among various treatments tried, lye peeling and debranning followed by washing were found to be very effective. The flour yield and quality (i.e., ash content, milling value, and colour grade value) of the Karnal-bunt-infected wheat were improved considerably by these treatments. The increase in proteolytic activity, total phenols, free fatty acids, and trimethylamine content due to bunt infection was reversed to an appreciable extent with the treatments. The

deteriorated dough rheological characteristics and bread quality and acceptability of flour infected with Karnal bunt were also significantly improved. Bread prepared from 5% Karnal-bunt-infected wheat treated with either method was comparable to bread prepared from sound wheat. AA

Narpinder Singh, Sekhon (KS), Srivastava (AK) and Gupta (PP). **Studies on the improvement of quality of wheat infected with Karnal Bunt. II. Nutritional and biological effects.** *Cereal Chemistry* 69(1): 1992: 55-60

The effect of feeding diets of wheat containing Karnal bunt and trimethylamine to rats and the effectiveness of debranning and lye peeling in controlling the adverse biological effects of the infected wheat on rats were investigated. The trials revealed that gains in body wt. and PER were lowest for the diet containing 10 meq of trimethylamine. Packed cell vol. and neutrophils and monocytes in the blood of rats were significantly reduced by the presence of Karnal bunt or trimethylamine in the diets, while reticulocytes, leucocytes, lymphocytes and eosinophils increased. The adverse effects of Karnal bunt on the hematological parameters were largely overcome by debranning and lye peeling. These treatments significantly reduced the activities of various enzymes in different organs and the plasma of rats from levels found for the diets containing Karnal bunt or trimethylamine. AA

Ranhotra (GS), Gelroth (JA), Glaser (BK) and Posner (ES). **Total and soluble fiber content of air-classified white flour from hard and soft wheats.** *Cereal Chemistry* 69(1): 1992: 75-77

None of the flour streams from wheat milling that are combined to produce white (straight-grade) flour contain more total dietary fiber (TDF) or soluble fiber (SF) than white flour itself. However, air classification of white flour obtained from hard and soft wheats revealed that a subfraction, termed A-fine, contains nearly twice as much TDF and SF as the original flour. The A-fine subfraction also contained about 150% more protein as well as more fat and ash than the original flour. Bread made with the A-fine subfraction contained 14% fewer calories, 63% more TDF, and 67% more SF than bread made with the original flour. AA

#### Wheat bran

Glenn (GM) and Johnston (RK). **Moisture-dependent changes in the mechanical**



Wheat bran strips were isolated from disks cut from individual wheat caryopses and conditioned at 100% RH ( $h_r$ ) to facilitate bran removal. The mechanical properties of the isolated wheat bran strips were obtained from force-deformation curves using uniaxial tension tests. The strips were tested at 0, 45, 71 and 100%  $h_r$ . The tensile strength ( $S_u$ ), percentage deformation to fracture ( $e_{max}$ ) and initial tangent modulus of elasticity ( $E$ ) were similar for bran strips from radial and longitudinal orientations, suggesting that wheat bran is nearly isotropic in nature. There were no consistent differences in the mechanical properties of bran from hard or soft wheat classes, but some varietal differences in  $S_u$  and  $e_{max}$  were found. The  $S_u$  and  $E$  values for bran strips equilibrated at 100%  $h_r$  were only 37% and 10% respectively, of the values obtained at 45%  $h_r$ . The  $e_{max}$  values were more than 3 times greater for bran equilibrated at 100%  $h_r$  than at 45%  $h_r$ . The energy required to break the samples was not affected by changes in  $h_r$ . Elastic ( $D_e$ ), residual ( $D_r$ ) and total ( $D_t$ ) deformation was measured in hysteresis test performed at 0% and 100%  $h_r$ . Sample deformation was much higher at 100%  $h_r$  than at 0%  $h_r$ . During five cycles of the hysteresis test,  $D_e$  remained relatively constant while  $D_r$  decreased with each cycle. AA

#### **Wheat proteins**

68

Shutton (KH), Hay (RL) and Mouat (CH). **The effect of kernel weight on the assessment of baking performance of wheats by RP-HPLC of glutenin subunits from single grains.** *Journal of Cereal Science* 15(3): 1992: 253-265

The baking performance of flour produced from grain fractions of the cv Otane increased with the av. kernel wt. of the fraction. The change in baking performance with kernel wt. for flours produced from grain fractions was predicted using RP-HPLC. Studies using single grains showed that, for Otane, the proportions of all the wheat storage proteins increased as a function of kernel wt., and that there was a high degree of grain-to-grain and sample-to-sample variability in both the total protein and HMW glutenin content. The accuracy of baking performance predictions for single grains using RP-HPLC was greatly improved when multiple, rather than single, grain analyses were performed. No relationship was found between the mean kernel wt. of individual samples and their baking performance. If this grain-size effect, and the high level of variability in protein content observed, can be demonstrated for other cvs, then rejection of a cv from a breeding programme on the basis of a

single kernel test would be ill-advised, regardless of the method used to measure protein content. AA

#### **Wheat starch**

69

Delwiche (SR), Pitt (RE) and Norris (KH). **Sensitivity of near-infrared absorption to moisture content versus water activity in starch and cellulose.** *Cereal Chemistry* 69(1): 1992: 107-109

Near-infrared (NIR) diffuse reflectance spectra of wheat starch and microcrystalline cellulose were gathered at  $a_w$  levels of 0.43 and 0.53 attained through adsorption or desorption. The primary interest was whether NIR absorption was more directly sensitive to  $a_w$  or to moisture content (MC). Results indicate that NIR spectroscopy can discriminate between different MCs at the same  $a_w$  but is much less sensitive to different  $a_w$  at the same MC. This suggests that separate models are not required when using NIR spectroscopy to estimate MC of carbohydrates that have reached equilibrium along vapour adsorption and desorption pathways. However, the use of NIR spectroscopy to determine the susceptibility of starch and cellulose to  $a_w$ -related deterioration processes may be confounded by their sorption history. AA

70

Skerrit (JH) and Hill (AS). **How "free" is "gluten free"? Relationship between Kjeldahl nitrogen values and gluten protein content for wheat starches.** *Cereal Chemistry* 69(1): 1992: 110-112

Kjeldahl nitrogen analysis of wheat starches submitted to 3 different lab. showed poor precision. The relationship between mean total Kjeldahl protein ( $N \times 5.7$ ) and gluten content was analyzed using a commercially available laboratory test kit based on specific antibodies. In general, the first 0.25% protein contained very little gluten, whereas most protein above the 0.3% level was in the form of gluten. Thus a 0.4% protein starch may contain up to 10 times as much gluten as a 0.3% protein starch. It was difficult using sodium-dodecyl sulphate polyacrylamide gel electrophoresis of starch extracts to clearly distinguish gluten polypeptides from starch granule proteins and to differentiate wheat starches that differed only slightly in protein content but markedly in gluten content. AA



## Corn

71

Urano (T), Trucksess (MW), Matusik (J) and Dorner (JW). **Liquid chromatographic determination of cyclopiiazonic acid in corn and peanuts.** *Journal of AOAC International* 75(2); 1992: 319-322

A liquid chromatographic (LC) method is described for the detn. of cyclopiiazonic acid (CPA) in corn and peanuts. CPA was extracted from the test portion with methanol-2% NaHCO<sub>3</sub> solution (7 + 3); the extract was defatted with hexane and then acidified. CPA was partitioned into chloroform and applied to a Sep-Pak silica cartridge. CPA was eluted with chloroform-methanol (3 + 1); the solvent was evaporated, and the residue was dissolved in methanol-water (60 + 40). CPA was quantitated by reversed-phase LC with a linear gradient of 0 - 4 mM ZnSO<sub>4</sub> in methanol-water (85 + 15) and UV measurement at 279 nm. Recoveries of CPA from corn spiked over the range of 50 - 500 ng/g and peanuts spiked over the range of 100 - 500 ng/g were 72 - 84% and 74 - 80%, respectively. The limits of quantitation for CPA in corn and peanuts were about 50 and 100 ng/g, respectively. CPA (820 ng/g) was found in corn naturally contaminated with aflatoxin B<sub>1</sub>, and CPA identity was confirmed by tandem mass spectrometry. AA

72

Ruan (R) and Litchfield (JB). **Determination of water distribution and mobility inside maize kernels during steeping using magnetic resonance imaging.** *Cereal Chemistry* 69(1); 1992: 13-17

Differences in water content and mobility in various components of corn kernels during steeping were measured by magnetic resonance imaging. The proton density and T<sub>1</sub> images (water distribution and mobility mapping) were obtained with a spatial resolution of 100 µm. The outside steepwater signal was well suppressed and the inside structure of the corn kernel was revealed clearly with proton density (p), spinlattice relaxation (T<sub>1</sub>), and apparent spin-spin relaxation (T<sub>2</sub>\*) images. The technique enabled clear definition of the principal tissues in corn kernels and provided quantitative information concerning differences in water distribution and mobility. AA

73

Wang (C) and Johnson (LA). **Wet-milling characteristics of propionate-treated**

**high-moisture maize. I. Yields and compositions of products.** *Cereal Chemistry* 69(1); 1992: 43-46

High-moisture (25.6%) maize was treated with 3 forms of 1.0% propionate (wt. treatments adjusted to obtain equivalent moles of propionate ion). These were propionic acid (99% pure, pH 1.7), a mixture of sodium propionate and sodium acetate (as might be recovered from fermentation) acidified with HCl to the pKa of propionic acid (pH 4.8), and the same mixture of sodium propionate and sodium acetate acidified to the natural pH of propionic acid (pH 1.7). Another sample of maize was forced-air dried (25°C) to 12% moisture and used as an untreated control. Treated maize was stored at 25°C for 6 months before wet milling. When the grain was treated with propionate, yields of germ were lower and contained less protein and more oil compared with untreated air-dried maize because of increased leaching of protein from germ during steeping. Starch yields increased because of propionate treatment, but residual protein levels in the recovered starch were unacceptably high. Gluten yields and purities of propionate-treated high-moisture maize were lower than those of untreated air-dried maize. AA

74

Wang (C) and Johnson (LA). **Wet-milling characteristics of propionate-treated high-moisture maize. II. Qualities of starch and gluten.** *Cereal Chemistry* 69(1); 1992: 47-49

High-moisture (25.6%) maize was treated with 3 forms of 1.0% propionate (wt. treatments adjusted to obtain equivalent moles of propionate ion). These were propionic acid (99% pure, pH 1.7), a mixture of sodium propionate and sodium acetate acidified with HCl to the pKa of propionic acid (pH 4.8), and the same mixture of sodium propionate and sodium acetate acidified to the natural pH of propionic acid (pH 1.7). Another sample of the maize was forced-air dried (25°C) to 12% moisture content. Propionate-treated and untreated maize samples were stored at 25°C for 6 months before wet milling. Starch recovered from propionate-treated maize contained greater amounts of residual protein than did starch from untreated air-dried maize and was more yellow in colour. Starch from propionate-treated maize had lower pasting viscosities than did starch from untreated air-dried maize, indicating partial hydrolysis. No differences in the thermal properties of the starches were observed. Gluten from propionate-treated maize contained lower concn. of protein and was less yellow than gluten from untreated air-dried maize. Addition of a small amount of NaCl to the mill-starch slurry improved starch-gluten separation in propionate-treated maize. AA



Raeker (MO), Bern (CJ), Johnson (LA) and Glatz (BA). **Preservation of high-moisture maize by various propionate treatments.** *Cereal Chemistry* 69(1): 1992; 66-69

The feasibility of using propionates produced from fermentation of maize to preserve high-moisture maize was investigated. The preservative effects of regular (pH 9.60), semiacidified (pH 4.86), and acidified (pH 1.70) salt solutions of a mixture of sodium propionate and sodium acetate (4.86:1.00) and of pure propionic acid were determined at propionate levels of 0.5 and 1.0% on maize harvested during 1987 at 17.6, 23.0 and 26.8% moisture. In a second test, the propionate treatments were applied to maize harvested during 1988 at 26.8 and 29.6% moisture, except the regular salt solution was replaced with either simulated fermentation broth or actual fermentation broth enriched with pure propionic acid. All propionate treatments except the regular (unadjusted pH) salt sol. acted as fungicides and maintained maize in a mold-free condition for more than a yr. All treatments prevented growth of *Aspergillus flavus* inoculated into the maize. Propionic acid fermentation broths were as effective as pure propionic acid. Pure propionic acid maintained the colour of high-moisture maize better than did the other treatments. However, all propionate-treated samples were rated as "U.S. Sample Grade" at the end of 1 yr of storage because of objectionable odour and high total damage. AA

76

Mistry (AH) and Eckhoff (SR). **Dry milling and physical characteristics of alkali-debranned yellow dent corn.** *Cereal Chemistry* 69(1): 1992; 82-84

The physical characteristics and dry-milling performance of alkali-debranned and untreated yellow dent corn were compared using standard lab. procedures. The debranned corn had approx. the same amount of protein and oil but half the crude fiber content of the untreated corn. The yields of No. 5, 7 and 10 grits were much higher for debranned corn than for untreated corn, with the milling evaluation factor for debranned corn at 454, compared to 277 for the untreated corn. Debranned corn degermed much faster, resulting in cleaner and easier separation of germ. Although the germ fraction obtained from the debranned corn was lower in yield, it was higher in oil content and thus 35% less germ would be required to extract the same amount of oil as from untreated corn. The crude fiber content of grits and germ fractions obtained from debranned corn was 40 - 50% less than that obtained from untreated corn. The bran obtained by debranning the corn contained more crude fiber

than that contained in the hull obtained by aspiration of untreated dry-milled corn. AA

77

Wilson (CM). **Zeins in sweet corn (Sugary-1).** *Cereal Chemistry* 69(1): 1992; 113

78

Thanaboripat (D), Ramunsri (W), Apintanapong (M) and Chusanatasana (K). **Effects of sodium chloride, propionic acid and ammonium hydroxide on growth of *Aspergillus flavus* on corn and aflatoxin production.** *ASEAN Food Journal* 7(1): 1992; 24-29

Sodium chloride at 40 and 80 mg/g concn. could inhibit only aflatoxin production while 120 mg/g NaCl inhibited both growth and aflatoxin production of *Asp. flavus* in corn after 7 and 14 days of incubation. The addition of propionic acid (PA) to the corn at 500, 1000 and 1500 µg/g concn. enhanced the production of aflatoxin whereas 2000 and 2500 µg/g of PA inhibited the formation of aflatoxin 0.2% NH<sub>4</sub>OH reduced the production of aflatoxin in corn by 45 and 60% at 7 and 14 days respectively while 0.5, 1.0 and 1.5% NH<sub>4</sub>OH completely inhibited the production of aflatoxin. SRA

#### Corn proteins

79

Hojilla-Evangelista (MP), Myers (DJ) and Johnson (LA). **Characterization of protein extracted from flaked, defatted, whole corn by the sequential extraction process.** *Journal of the American Oil Chemist's Society* 69(3): 1992; 199-204

An investigation was conducted to identify and characterize protein extracted by 45% ethanol:55% 0.1 M NaOH from flaked, defatted, undegermed corn (*Zea mays* L.) during Sequential Extraction Processing (SEP). This new approach to corn milling, SEP, recycles the ethanol produced from the fermentation of corn starch to upstream steps of protein extraction and the simultaneous extraction of corn oil and dehydration of the ethanol. About 10% of the protein was extracted by ethanol during counter-current-percolation oil extraction. Sodium dodecyl sulphate-polyacrylamide gel electrophoresis (SDS-PAGE) and amino acid analysis identified this protein as zein. Nearly 65% of the total protein was recovered by the process in the protein extraction step from soft dent corn (Pioneer 3377), medium-hard dent corn (Pioneer 3732) and high-lysine corn. The freeze-dried solids of the ethanol/alkali extracts from these corn hybrids contained about 80% crude protein (db). The amino acids were present in quantities similar to those in



whole corn and markedly higher than those in corn gluten meal. These results indicate that SEP produces high-quality protein suitable for food and industrial uses. AA

#### Corn starch

80

Nyanzi (FA) and Maga (JA). **Effect of processing temperature on detergent-solubilized protein in extrusion-cooked corn starch/soy protein subunit blends.** *Journal of Agricultural and Food Chemistry* 40(1): 1992: 131-133

The effects of extrusion processing temp. (50, 100, 150°C) on protein solubilized by phosphate buffers (with and without sodium dodecyl sulphate (SDS)) were examined. The study was done utilizing corn starch/soy protein fraction model food systems. All samples containing  $\beta$ -conglycinin had the highest levels of protein solubilized by phosphate buffer at all processing temp. There was about a 5-fold increase in the level of phosphate buffer insoluble protein solubilized by SDS-phosphate buffer when unprocessed samples were compared with those processed at 50°C. Virtually all added protein (more than 0.9 g of protein/g of added protein) was solubilized by SDS-phosphate buffer in the samples containing  $\beta$ -conglycinin. Samples containing soy protein isolate or glycinin had lower levels of protein solubilized by both phosphate buffers. AA

#### PULSES

81

Kabirullah (M), Ahmed (R), Khan (SA), Rubbi (SF) and Faruque (O). **A comparative study on the nutritive value of Bangladesh FPC type-B and Norweglean FPC type-B and their potency to supplement a cereal-pulse diet.** *Bangladesh Journal of Scientific and Industrial Research* 26(1-4): 1991: 8-18

To explore newer sources of protein-rich food, FPC type-B from 2 sources have been studied for their nutritive value and potency to supplement a cereal-pulse (CP) diet. Bangladesh FPC (BFPC) and Norwegian FPC (NFPC) showed PER values 2.00 plus or minus 0.00 and 2.04 plus or minus 0.08 respectively against the PER value of 3.04 plus or minus 0.03 observed for milk protein. Supplementation of about 5.3 g pulse protein in the CP diet with the FPC and milk protein significantly improved PER value, growth of normal rats, capacity to regenerate the growth of protein malnourished rats and in some cases the biological values. Results indicated that the two FPC are comparable in their overall nutritive value. A combination of an animal

protein with a plant protein, raised the nutritive value of the mixture much higher than that of the animal protein fed alone. Further the results indicated that the FPC may be used in place of or parallel to milk in the supplementation of a CP diet and preparation of protein-rich food for vulnerable groups. AA

#### Cowpea

##### Cowpea pastes

82

McWatters (KH), Enwere (NJ) and Fletcher (SM). **Consumer response to akara (fried cowpea paste) served plain or with various sauces.** *Food Technology* 46(2): 1992: 111-114

Deals with the study conducted to assess the consumer acceptance of akara, a flavorful fried food from West Africa prepared from whipped and seasoned cowpea paste and served plain or with various sauces. The results show that the consumers were willing to pay more per piece for the fully cooked, convenient forms of akara than for those that required preparation and cooking. CSA

#### Faba beans

83

Schultz (M), Schmidt (G), Krause (J-P), Seifert (A) and Schmandke (H). **Low methoxy pectin/protein interaction in o/w emulsions - effects of acetylated faba bean globulin.** *Die Nahrung* 35(10): 1991: 1067-1069

The addition of low methoxy pectin to maximal acetylated faba bean globulin in o/w emulsion leads in the pH range between 5.5 and 6.5 to an increased protein content in the protein film around the oil droplets. This effect is accompanied with a rise of the apparent viscosity and flow behaviour index of the emulsions. In agreement with these modifications increased emulsion stability against creaming is found. AA

84

Alka Sharma and Salil Seghal. **Effect of processing and cooking on the antinutritional factors of faba bean (*Vicia faba*).** *Food Chemistry* 43(5): 1992: 383-385

Two var. (VH-131, WF) of faba bean were subjected to soaking, dehulling, ordinary cooking, autoclaving and sprouting. Soaked and dehulled seeds showed reductions in phytic acid (4%) and saponin (26 - 29%) in both var. and further autoclaving for 25 min resulted in max. loss of antinutrients. Antinutrient



concn. declined during germination proportionate to the period and lectin was found even after 48 h of sprouting. SD

## Nuna

85

Van Beem (J), Kornegay (J) and Lareo (L). **Nutritive value of the nuna popping bean.** *Economic Botany* 46(2); 1992; 164-170

The nutritive value of raw, toasted and boiled nuna (*Phaseolus vulgaris*, grown in Andean highlands of South America and consumed as snack food after toasting process) and dry bean cv were compared and the extent to which lectins and tannins were deactivated in the toasting process were determined. Proximate analysis revealed that nunas has a higher starch, amylose and Cu content than 4 var. of dry bean and a lower protein, P, Fe and B content. Due to high starch content nunas had a unique taste and texture. Antinutritional factors like lectins were higher in raw and boiled nuna samples than in toasted ones. Tannin level did not show any change from raw to toasted treatments. Over all *in vitro* digestibility was slightly lower for toasted nunas than boiled dry bean. GS

## Peas

86

Forni (E), Crivelli (G), Polesello (A) and Ghezzi (M). **Changes in peas due to freezing and storage.** *Journal of Food Processing Preservation* 15(6); 1991; 379-389

Peas (9 new lines and 1 cv) stored at -20°C for 6 months and analysed showed that blanching and freezing caused losses mainly of dry matter, acidity and sugar; colour was stable. No significant changes in chemical composition were observed. Colour, flavour, texture and appearance were acceptable both after freezing and cold storage for 6 months. SD

## OILSEEDS AND NUTS

### Rapeseeds

87

Bibi (N), Sattar (A) and Chaudry (MA). **Phenolic constituents in major fractions of tropical rapeseed.** *Die Nahrung* 35(10); 1991; 1053-1059

Commercial rapeseed var. (Ganyou-5, Westar, Raya-brown and Raya-yellow) grown under tropical

conditions in Pakistan showed wide variations in different phenolic constituents in relation to extractants (methanol, methanol-HCl) used. Hulls of all var. contained higher levels of catechin, procyanidine, pronanthocyanidine and flavan-4-ols while lower amounts of sinapine, tannic acid and total phenols than the cotyledons. Cotyledons and hulls in seeds of Raya-brown were exceptionally high in procyanidine. BV

88

Ohlson (R). **Modern processing of rapeseed.** *Journal of the American Oil Chemist's Society* 69(3); 1992; 195-198

The various processing steps for rapeseed into finished oil and meal products are reviewed with special reference to the inclusion of an extruder step in oil extraction, an aqueous enzymatic process to separate flakes into oil, flour and molasses, the total degumming process, and the new central-Ad process to eliminate small quantities of impurities (dissolved or emulsified) from large volumes of liquid by a continuous adsorption-centrifugation technique. BV

### Soybeans

89

Dornbos (DLJr) and Mullen (RE). **Soybean seed protein and oil contents and fatty acid composition adjustments by drought and temperature.** *Journal of the American Oil Chemist's Society* 69(3); 1992; 228-231

Both drought and high air temp. stress during soybean seed fill affect the proportion, quantity and quality of the seed oil and protein available to processors. Understanding the environmental conditions of the production environment may help processors predict the quantity and quality of the desired products obtainable from the soybean seed. BV

90

Mohamed (AI) and Rangappa (M). **Nutrient composition and anti-nutritional factors in vegetable soybean. II. Oil, fatty acids, sterols and lipoxigenase activity.** *Food Chemistry* 44(4); 1992; 277-282

Analysis of 17 vegetable soybean genotypes gave the following mean values: oil 18.44%, lipoxigenase activity 2176.3 units/min/mg meal;  $\beta$ -sitosterol 45.95%; stigmasterol 16.48%; campsterol 16.06%; dihydroxybrassicasterol 5.62%; linoleic 53.34% and linolenic acids 9.19% oleic was inversely correlated to linoleic ( $r = -0.820$ ) and to linolenic ( $r = -0.663$ )



acids. Some of the cvs showed high oil, linoleic, linolenic and sterol content of vegetable-type soybeans. SD

91

Nowak (J) and Szebiotko (K). **Some biochemical changes during soybean and pea tempeh fermentation.** *Food Microbiology* 9(1); 1992: 37-43

This study reports some biochemical changes occurring during pea (*Pisum sativum*) and soybean (*Glycine max*) fermentation using *Rhizopus oligosporus* 2710. Soybean tempeh was made using 3 different schedules for the hydrothermal preparation of soybeans. Results showed that fermentation led to significant decrease in protein nitrogen and increase in ammonial-nitrogen and amino-nitrogen in soybean and pea. The preparation schedule of soybean resulted in differences in protein changes during fermentation. Fermentation for 24 h at 37°C was not enough to decrease raffinose-family sugars in soybeans with or without husks. Incubation for 48 h decreased stachyose content. SRA

## Soy products

### Miso

92

Sautiogo (LA), Hiramatsu (M) and Mori (A). **Japanese soybean paste Miso scavenges free radicals and inhibits lipid peroxidation.** *Journal of Nutritional Science and Vitaminology* 38(3); 1992: 297-304

Japanese soybean paste miso, which has been reported to prevent gastric and mammary cancer and chronic nephritis, was demonstrated by electron spin resonance spectrometry using 5,5'-dimethyl-1-pyrroline-N-oxide as a scavenger of free radicals. 50 mg/ml of miso scavenged 100% of 1,1-diphenyl-2-picrylhydrazyl radicals ( $3.9 \times 10^{15}$  spins/ml); and 50 mg/ml quenched 92% of hydroxyl radicals ( $7.9 \times 10^{15}$  spins/ml); and 50 mg/ml quenched 50% of superoxide anion ( $6.7 \times 10^{16}$  spins/ml). In the system of rat cerebral cortex homogenate supplemented with 2 mM each of  $\text{Fe}^{2+}$  and ascorbic acid, 90% and 82% of the hydrogen and carbon-centred radicals having  $1.7 \times 10^{13}$  spins/ml and  $3.9 \times 10^{13}$  spins/ml, respectively, were quenched by 180 mg/ml of miso. The thiobarbituric acid-reactive substances, an index of lipid peroxidation in the brain, was inhibited by 10 mg/ml of miso. These results showed that miso acts as an antioxidant by scavenging free radicals. AA

### Soy flour

93

Horvath (E) and Czukor (B). **Characterization of raw dielectric heated soybean flours of two different particle sizes.** *Acta Alimentaria* 20(1); 1991: 39-46

Raw and dielectric treated soy samples were milled to full-fat flours of particle size: 0 - 250  $\mu\text{m}$  and 0 - 630  $\mu\text{m}$ , respectively. Chemical composition, functional properties (water and fat absorption capacity, nitrogen solubility index), protein extractability (PE) and *in vitro* protein digestibility (PD) of samples were determined. Results showed that the studied functional properties except for water absorption capacity and PE of samples were decreased, *in vitro* PD was increased by dielectric heat treatment. The particle size of both raw dielectric treated samples affected their properties. Soy flours of smaller particle size (0 - 250  $\mu\text{m}$ ) had higher values of functional properties and higher PD and PE in buffer  $\text{Na}_2\text{HPO}_4$  (pH = 7.8) and in this buffer containing either sodium dodecyl sulfate (SDS) or SDS + 2-mercaptoethanol than soy flours of particle size 0 - 630  $\mu\text{m}$ . AA

## Soy proteins

94

Lopez de ogara (MC), Delgado de Layno (M), Pilosof (AM) and Macchi (RA). **Functional properties of soy protein isolates as affected by heat treatment during isoelectric precipitation.** *Journal of the American Oil Chemist's Society* 69(2); 1992: 184-187

Research was carried out on the influence of heat treatment during isoelectric precipitation on the functionality of the resulting isolates prepared from "low-heated", undenatured, defatted soy flour. The isoelectric dispersions were heated at 50, 60, 65 or 70°C for 30 min and characterized for solubility, water absorption capacity, oil absorption capacity, viscosity and gel properties. The effect of heat treatment during isoelectric precipitation was reflected by all the functional properties. The soy isolate heated at 60°C showed remarkably different flow characteristics. It yielded the most viscous dispersions and the strongest gels and also the highest water absorption capacity value. Simple and multiple linear regression models were used to provide a description of the relationship between the different properties studied. Significant correlations were found between gel viscosity and water absorption capacity. Gel characteristics also correlated significantly with viscosity of 20% dispersions. Viscosity of dispersions correlated to solubility or to water absorption capacity, depending on protein concn. That dependence was quantified and a highly significant multiple correlation was



found between viscosity and the independent variables of log solubility and water absorption capacity. AA

95

Peterson (RE) and Wolf (WJ). **Enhancement of high-performance liquid chromatography of soybean proteins by addition of sodium dodecyl sulphate.** *Cereal Chemistry* 69(1): 1992: 101

## TUBERS AND VEGETABLES

### Carrots

96

Lund (ED) and Bruemmer (JH). **Sesquiterpene hydrocarbons in processed stored carrot sticks.** *Food Chemistry* 43(5): 1992: 331-335

Five types of infusion treated carrot sticks, with antimicrobial, antioxidant and cellular constituents, stored in plastic vacuum shrink bags at 2°C for 3 wks, showed marked decrease in 2 major sesquiterpene hydrocarbons (caryophyllene and  $\gamma$ -bisabolene) while the control showed moderate decrease in the second wk of storage. SD

97

Ben-Shalom (N), Plat (D), Levi (A) and Pinto (R). **Influence of pH treatment on pectic substances and firmness of blanched carrots.** *Food Chemistry* 44(4): 1992: 251-254

Firmness of carrot tissue ranged from 58 - 86N, reaching the max. at pH 4.4. After pH treatments, EDTA-soluble pectin increased after blanching at all pH: total pectin decreased at pH 4.4 compared to higher (6.2) or lower (3.9) pH values, and lower amounts of soluble pectin were found. Firmness and alkali-soluble pectin showed significant positive correlation. SD

### Cassava

98

Adegoke (GO), Babalola (AK) and Akanni (AO). **Effects of sodium metabisulphite, hydrogen peroxide and heat on aflatoxin B1 in lafun and gari - two cassava products.** *Die Nahrung* 35(10): 1991: 1041-1045

Sodium metabisulphite (SMS) and H<sub>2</sub>O<sub>2</sub> alone or in combination with heat (50 - 70°C) were found to be effective in degrading aflatoxin B1 (AFB1) in lafun and gari. H<sub>2</sub>O<sub>2</sub> at a concn. of 3% in the aqueous phase gave a 12.5% degradation of AFB1 in lafun

and at 50°C, degradation levels of 25% and 50% were obtained with 6.0 and 9.0% H<sub>2</sub>O<sub>2</sub>, respectively. When SMS was applied during the production of gari (a fermented cassava product heated to 50 - 70°C during production) AFB1 degradation levels were found to be 65.8%, 60.9%, 41.5% and 36.6%, respectively, for SMS levels of 1.0%, 0.8%, 0.5% and 0.3%. AA

### Taploca

#### Taploca starch

99

Kumar (VNG), Bhandari (MV) and Bhat (AN). **Modifications of tapioca starch properties by polyethylene glycol (4000) and polyethylene glycol (4000) stearate additives.** *Starch/Starke* 43(3): 1991: 93-98

Changes in crystallinity, iodine binding capacity and infrared spectral characteristics of tapioca starch on incorporation of polyethylene glycol (4000) and polyethylene glycol (4000) distearate additives into gelatinised starch have been investigated. A plausible explanation for the appearance of crystallinity for gelatinised starch on incorporation of the additives is given. The additives were also shown to influence the gelatinisation temp. of native tapioca starch. The DSC studies indicating this effect are discussed in detail. AA

### Vegetables

#### Leafy vegetables

#### Amaranthus

100

Kauffman (CS). **Realizing the potential of grain amaranth.** *Food Reviews International* 8(1): 1992: 5-21

Review. 95 references. SRA

101

Bressani (R), Sanchez-Marroquin (A) and Morales (E). **Chemical composition of grain amaranth cultivars and effects of processing on their nutritional quality.** *Food Reviews International* 8(1): 1992: 23-49

Review. 27 references. SRA

102

Gupta (VK) and Timba (D). **Grain amaranth: A promising crop for marginal areas of Kenya.** *Food Reviews International* 8(1): 1992: 51-69

Review. 8 references. SRA

103

Espita (E). **Amaranth germplasm development and agronomic studies in Mexico.** *Food Reviews International* 8(1): 1992: 71-86

Review. 7 references. SRA

104

Kalinowski (LS), Navarro (JP), Concha (AIR), Hermoza (GC), Pacheco (RA), Choquevilca (YC), Jara (EV). **Grain amaranth research in Peru.** *Food Reviews International* 8(1): 1992: 87-124

Review. 25 references. SRA

105

Duriyaprapan (S), Buranasilpin (P), Tanpanich (S), Chitnawasarn (S) and Watanakul (J). **Preliminary evaluation and screening of introduced amaranth in Thailand.** *Food Reviews International* 8(1): 1992: 125-142

Review. 11 references. SRA

106

Senthong (C), Julsrigival (S), Tiyaalee (D) and Wivutvongvana (P). **Germplasm screening of grain amaranth in Chiang Mai, Thailand.** *Food Reviews International* 8(1): 1992: 143-157

Review. 30 references. SRA

107

Kauffman (CS). **The status of grain amaranth for the 1990s.** *Food Reviews International* 8(1): 1992: 165-185

Review. 10 references. SRA

#### **Amaranthus paniculatus starch**

108

Singhal (RS) and Kulkarni (PR). **Studies on cross-linked A. paniculatus (Rajgeera) starch.** *Starch/Starke* 43(1): 1991: 15-18

Earlier studies on waxy *Amaranthus paniculatus* starch have shown it to be sensitive to mechanical

shear and acidity. Cross-linking of this starch with phosphorus oxychloride at room temp. for 10 min using 5 ml POCl<sub>3</sub> per 100 g starch improved the stability under canning conditions, low pH and also mechanical shear. Its paste clarity also improved distinctly. However, it had very poor freeze-thaw stability indicating it to be unsuitable for frozen foods. Evaluation of this starch in canned tomato soup showed it to be a useful thickener for foods processed under retort conditions. AA

#### **Tomatoes**

109

Bessar (BAA), Korany (K) and Szabo (AS). **Effect of home preparative procedures and technological processes on lindane residues in tomato.** *Acta Alimentaria* 20(1): 1991: 25-29

Washing tomato fruits with water and detergents reduced lindane residues by 31.7% and 42.6% respectively immediately after treatment and 15 days later by 19.9% and 55.9% respectively of the initial amount present in unwashed samples. The prescribed waiting period of 15 days post treatment reduced the level of lindane residues to 23.9% of the initial amount found directly after treatment. All technological processes lowered lindane residue level from 19.9% to 50% immediately after treatment and from 17.5% to 100% after 15 days post treatment. BV

110

Tansakul (A), Noomhorm (A), Bhumiratana (S) and Patmayothin (N). **Effect of pulper-finisher specifications on tomato juice characteristics.** *ASEAN Food Journal* 7(1): 1992: 56-58

The chemical and physical characteristics of fresh VF-134 tomatoes used in this exp. with 2 pulper finishers (2-blade and 3-blade) showed the effect of different screen sizes (0.5, 1.0, 1.5 mm) and different speeds (100, 300, 500, 700 r.p.m.) on total solids, particle size distribution, consistency index and yield of tomato juice. For a 1.0 mm screen size and 700 r.p.m. speed, the consistency of tomato juice increased. At given speed the greater screen size allowed more tomato pulp, tomato serum resulting in higher yield of tomato juice. Yields, total solids of tomato juice, puree and pulp/serum ratio of tomato juice were higher from 3-blade pulper finisher than with 2 blades. Significant increases were observed for consistency index using 3-blade unit due to higher total solids, pulp/serum ratio. The operating combination of 1.0 mm screen and 700 r.p.m. speed produced highest consistency in tomato puree and juice in both pulper-finished. SRA



111

Kailasapathy (K) and Melton (LD). **Woolliness in stone fruits.** *ASEAN Food Journal* 7(1); 1992: 13-16

Briefly reviews the factors affecting woolliness, control of woolly break down pectolytic enzymes, pectic substances and woolliness, cell walls and woolliness. 40 references. SRA

## Apples

112

Mandhar (SC), Singh (MD), Marcondes (JA) and Lee (JL). **Evaluation of apple packages under simulated transport conditions.** *Packaging India* 25(1); 1992: 31-34

Corrugated fibre board (CFB) containers used for export of apples were tested to the standards of American Society for Testing and Materials (ASTM D4169-86). The fully telescopic containers (FTC) could withstand the requisite dynamic compression load. The cushioning and isolation reduced the equivalent bruise index (EBI) from 89.58% to 38.74% for FTC. Small size FTC with corrugated fibre board cell pack is recommended for packaging of horticultural produce. AA

113

Macheix (J-J), Sapis (J-C) and Fleuriet (A). **Phenolic compounds and polyphenoloxidase in relation to browning in grapes and wines.** *CRC Critical Reviews In Food Science and Nutrition* 30(4); 1991: 441-486

The two main factors that determine the intensity of browning (oxidable substrate content and oxidasic activities), oxygen uptake and evolution of phenolic compounds associated with this browning, and the main approaches that can be used to control oxidation and browning intensity in wine processing are discussed in this article. 419 references. SRA

## Citrus

114

Braddock (RJ) and Cadwallader (KR). **Citrus by-products manufacture for food use.** *Food Technology* 46(2); 1992: 105-110

Various processing techniques and isolation procedures of citrus by-products - dried pulp and pellets, molasses, essential oils (limonene, cold pressed oil, essences, bioconversion products),

pectin, fiber, flavonoids and limonin, cloud, microbial products and other by-products for their efficient utilization for food use is covered. CSA

## Grapes

115

Salinas (MR), Alonso (G), Navarro (G) and Pardo (F). **Contribution to study of the major aromatic components in the industrial processing of wine by carbonic maceration of Monastrell grapes. I: Isobutanol, 1-butanol, 2-methyl-1-butanol and 3-methyl-1-b.utanol.** *Anales de Bromatologia* 42(2); 1990: 209-217 (Es)

116

Salinas (MR), Alonso (G), Navarro (G) and Pardo (F). **Contribution to study of the major aromatic components in the industrial processing of wine by carbonic maceration of Monastrell grapes. II: Ethyl acetate, isopentyl acetate, methyl acetate, ethyl formate and ethyl propionate.** *Anales de Bromatologia* 42(2); 1990: 219-226 (Es)

## Papayas

117

Rangaswamy (K), Karunanithi (R), Jesudas (DM) and Swaminathan (KR). **The new tray for papain collection is a low-cost one.** *Indian Horticulture* 37(1); 1992: 24, 27

A low-cost new tray for collection of papain developed by Tamil Nadu Agricultural University, Coimbatore, is convenient to fix and remove from papaya trunk. The identical or symmetrical parts of tray are fixed to the plant by a flexible curved sheet metal clamp or fixture and a canvas strap or rope. The frame can accommodate a nylon or polythene sheet fixed either by stitching or clips. The new tray has completely overcome the constraints of the traditional trays. It weighs 500 g, easy to fabricate and costs Rs. 20. SRA

118

Soponronnarit (S), Achariyaviriya (S) and Tasaso (P). **Optimum strategies for drying papaya glaze.** *ASEAN Food Journal* 7(1); 1992: 17-23

This study reports the development of a mathematical model which can predict the drying (cabinet drying papaya glaze) rate with fair accuracy at an initial product moisture content of about 45% d.b. Variables considered were air-flow rate, air temp. and fraction of air recycled. The criteria for optimum drying of papaya glaze in a cabinet dryer were product quality, drying time and energy consumption. Experimental and simulated results



showed that a drying temp. of 65°C, a specific air flow rate of about 50 kg dry air/h-kg dry papaya glaze and about 0.8 of air recycled should be used. SRA

119

Chan (HTJr) and Ramanajaneya (KH). **Enzymatic deoxygenation of aseptically packaged papaya puree during storage.** *ASEAN Food Journal* 7(1): 1992: 47-50

#### Sapota

120

Man (YC), Taufik and Karim (MNA). **Storage stability of ciku leather.** *ASEAN Food Journal* 7(1): 1992: 53-55

Storage studies of ciku (*Achras sapota* L.) leather (intermediate moisture food) conducted over 3 months showed no significant difference in taste, colour, firmness or overall acceptability. Due to the low  $a_w$  and the presence of sorbic acid and  $\text{Na}_2\text{H}_2\text{SO}_4$  in the formulation, the mould counts were low ( $4.7 \times 10^1$  to  $5.0 \times 10^1$ /g). Results of this study indicate that ciku leather was stable at ambient temp. (27°C) and 5°C for 3 months. BV

#### CONFECTIONERY, STARCH AND SUGAR

121

Schulze (J) and Zunft (H-J). **Lactose - a potential dietary fiber. On the regulation of its microecological efficiency in the intestinal tract. Part 3. Dietary fibre effects of lactose due to microbial activity.** *Die Nahrung* 35(9): 1991: 903-920 (De)

The activity of the mucosal  $\beta$ -galactosidase of caecum and colon is low in both germfree and conventional rats.  $\beta$ -Galactosidase activity occurs also in the chymus of germfree rats. It increases after monoassociation and is higher in conventional than in germfree animals. Lactose entering caecum and colon acts like dietary fibre and is hydrolysed mainly by the intestinal flora. Aerobe lactobacilli and bacteroides predominate in the microflora of rat caecum and colon. A lactose-containing diet increases the total number of germs and stimulates the growth of bifidobacteria. After special diets, rich in lactose and low in protein and phosphate (e.g. human milk and similar formulae), the number of bacteriodes and other putrefactive germs decreases. Moreover, a lactose-containing diet alters the metabolic activity of intestinal microorganisms (activity of microbial  $\beta$ -galactosidase, acidification and lowering of pH in the chymus, production of

hydrogen, proteolytic activity). Lactose as dietary fibre decreases the nitrogen excretion in the urine and increases the N-excretion in the faeces of conventional rats. AA

122

Zunft (H-J) and Schulze (J). **Lactose - a potential dietary fibre. On the regulation of its microecological efficiency in the intestinal tract. Part 4. Dietary fibre effects of lactose: Evaluation by multiple statistical methods.** *Die Nahrung* 35(9): 1991: 921-948 (De)

The conditions and the intestinal processes responsible for the action of lactose dietary fibre are described. The  $\beta$ -galactosidase activity in the rat caecum and colon is influenced by dietary factors. It declines with increasing lactose concn. and it rises with increasing protein and phosphate concn. in the diet. The enzyme activity correlates negatively with the content of lactose, and positively with the content of protein and phosphate in the chymus. The products of lactose hydrolysis are degraded by microbial glycolysis in caecum and colon. The glycolytic products are mainly absorbed and energetically utilized by the macroorganism. Phosphate stimulates the microbial metabolism and, therefore, accelerates the consumption of the energy substrate lactose. Mathematical optimization gives the necessary composition of the diet which causes an intended microecological effect. To minimize the chymus pH (5.1 in the colon ascendens; 4.6 in the colon descendens; 4.3 in the faeces) the lactose content of the diet has to be greater than or equal to 160  $\mu\text{mol/g}$ , the protein content less than or equal to 10 mg/g, and the phosphate content less than or equal to 5.5  $\mu\text{mol/g}$ . The minimal pH value depends to a greater extent on variations in the supply of protein and phosphorus with the diet whereas the response to changes in lactose concn. is less noticeable. AA

#### Confectionery

123

Kumar (KR). **Packaging aspects of confectionery items.** *Indian Food Industry* 11(1): 1992: 34-39

The packaging requirements of confectionery items (hard boiled sugar confectionery, toffees, gums and chocolates) are discussed. Summarises the physico-chemical property requirements of packages for confectionery items and the characteristics of packaging materials and package forms of cellulose, polyolefins, vinyls, polyester and polyamides, nylons, metallized films, Al foil, multilayer flexible packaging materials (paper-board cartons, plastic containers and metal containers). CSA



## Honeys

124

Sancho (MT), Muniategui (S), Huidobro (JF) and Lozano (JS). **Aging of honey.** *Journal of Agricultural and Food Chemistry* 40(1): 1992: 134-138

Diastase number (DN) and hydroxymethylfurfural (HXMf) content were determined for 115 honey samples at 4, 16, and 28 months after their extraction. The mean values for all samples show linear relations between DN and the logarithm of the time and between the logarithm of the HXMf content and the time. In these honeys, the long-term effects of heat and storage affect the increase in HXMf content to a greater degree; however, given the nature of some samples, the DN is the limiting factor for freshness in the short term. The factors determining the freshness date of the honeys were also studied and suggestions made for a quality control rule. AA

## Starch

125

Upadhyay (CM), Nehete (PN), Shah (DN), Shah (NK), Shankar (V), Kothari (RM). **Alternate economical starchy substrates for the production of 70% sorbitol.** *Starch/Stärke* 43(3): 1991: 107-113

In view of the soaring prices of corn and tapioca starch, use of their hydrolysate in the production of 70% sorbitol became less remunerative. Therefore, an economical alternative is explored by using hydrolysates of cereal flours, namely, rice (*Oryza sativa*), wheat (*Triticum aestivum*), jowar (*Sorghum vulgare*) and bajra (*Pennisetum typhoideum*). A protocol is devised to a) prepared their high DE hydrolysates, b) purify it after saccharification, c) monitor the chemical characteristics of conc. hydrolysate, as feedstock for Raney nickel catalyzed pressure of hydrogenation and d) finally prepare 70% sorbitol. Merits and demerits of hydrolysates of these cereal flours are discussed in terms of operational limitations and percentage recovery, the governing factors for their industrial acceptability. Rice flour hydrolysate appears to be an alternative substrate, operationally and economically. AA

126

Jane (J-L) and Chen (J-F). **Effect of amylose molecular size and amylopectin branch chain length on paste properties of starch.** *Cereal Chemistry* 69(1): 1992: 60-65

Amyloses were fractionated from potato, normal and high-amylose corn VII starches to yield large,

intermediate, and small mol. wt. amyloses, respectively. Amylopectin were fractionated from high-amylose corn V, waxy corn, and normal rice starches to yield long, intermediate, and short branch chain amylopectins, respectively. Reconstituted starches made with mixtures of these amyloses and amylopectins at different combinations and proportions were studied for their paste properties (viscosity, gel strength, and light transmittance). Synergistic effects on paste viscosities were observed when the amyloses and amylopectin were mixed. The long branch chain amylopectin and the intermediate mol. size amylose produce the greatest synergistic effect on viscosity. AA

127

Carr (ME), Kim (S), Yoon (KJ) and Stanley (KD). **Graft polymerization of cationic methacrylate, acrylamide, and acrylonitrile monomers onto starch by reactive extrusion.** *Cereal Chemistry* 69(1): 1992: 70-75

Starch graft copolymers were prepared from cationic methacrylate (CM), acrylamide (AAM), and acrylonitrile (AN) monomers by continuous twin-screw extrusion processing. The monomers were reacted separately with corn starch under various conditions in the extruder with ceric ammonium nitrate (CAN) as the initiator. The purpose of the study was to determine the feasibility of grafting substantial levels of monomer onto the starch within brief reaction periods of 3-7 min. Effects of temp., monomer-starch wt. ratio, starch concn., CAN addition level, screw speed, and other variables in the extrusion process were studied. For comparison, starch graft copolymers from these monomers were prepared by typical 2 h batch processes at relatively low material concn., temp., and shear stress conditions. In extrusion processing, starch graft polyacrylonitrile (St-g-PAN) copolymer products with high conversion of monomer to polymer (74 - 78%) and high synthetic polymer add-on (42 - 44% of product wt.) were achieved within a reaction period of 7 min. Under similar extrusion conditions, add-on was 16 - 19% and conversion was 19 - 23% for AAM. Max. add-on was only 6.7% for the CM monomer. AAM also was reacted with waxy maize to give 18 - 23% add-on. The waxy maize copolymers were more water soluble than the corn starch copolymers. Results suggest that the continuous extrusion process could be particularly promising as a viable means of rapidly and efficiently producing St-g-PAN copolymers that are useful after saponification as commercial water-absorbent materials. AA



Jane (J-L), Shen (L) and Aguilar (F). **Characterization of pejbaye starch.** *Cereal Chemistry* 69(1): 1992: 96-100

Starches were isolated from dried fruits of pejbaye palm (*Bactris gasipaes*) grown in the following regions of Costa Rica: Sarapiquí, Limón, Guapiles, Parrita, and Turrialba. Pasting, gelling, and thermal properties of the starches were investigated. Amylose and phosphorus contents, amylose mol. size, and amylopectin branch chain lengths were analyzed. Onset of gelatinization temp. varied from 49 to 53°C. Enthalpy changes varied from 2.2 to 2.7 cal/g. Viscosity consistency of the starch pastes (8%, dry-starch basis) at 52°C varied from 520 to 1,100 BU (using a Brabender Viscoamylograph). Amylose contents varied from 8 to 19%, and P contents ranged from 0.049 to 0.054%. Branch chain lengths of amylopectin determined with the peak fractions had degrees of polymerization of 18 and 30 for short and long branches, respectively. Physical property variations were mainly attributed to differences in amylose contents and amylopectin structures. AA

## BAKERY PRODUCTS

Narpinder Singh, Harinder (K), Sekhon (KS) and Bhupinder Kaur. **Studies on the improvement of functional and baking properties of wheat-chickpea flour blends.** *Journal of Food Processing Preservation* 15(6): 1991: 391-402

Wheat flour was blended with chickpea flour (CF) (10, 20 and 30%) gluten (1.5, 3, 4.5 and 6%) and sodium steryl-lactylate (SSL) 0.5% CF at 10 and 20% improved the dough stability and degree of softening while loaf vol., specific vol. and crumb softness of bread decreased with increased CF. Gluten at 3% level effectively improved the rheological, loaf vol. and crumb characteristics. In chapathi, puffing and softness, which deteriorated with increased CF, were improved by SSL. In cookie, SSL improved the spread factor upto 10% CF level while softness improved with increased CF. SD

Sinha (LK). **Use of soy flour in bakery products.** *Indian Baker* 23(3): 1992: 13-17

Soy flour with its high lysine content increases the protein content of bakery products and improves amino acid balance, increases water absorption, decreases mixing time, reduces fermentation. It also results in less-fat consumption, emulsification,

structure building, textural improvements, crumb tenderness, crumb whiteness and extension of shelf-life. Soy flour supplementation enriches functional and nutritional properties of baked products (bread, cake, biscuit and doughnuts). SD

Vaidehi (MP), Jamuna and Mushtari Begum (J). **Acceptability and storage study of iron and vitamin-A enriched baked products.** *Indian Baker* 23(3): 1992: 21-27

Thirteen types of bakery products for nutritionally deficient (anaemia, vitamin-A deficiency) population were developed, using wheat flour supplemented with 10 - 15% defatted soy flour for biscuits and 5 - 10% for cakes and breads. Biscuits showed a longer shelf-life (9 days) than cakes, bread and puffs (4 - 6 days). The products developed commonly for both anaemia and vitamin-A deficiency were more acceptable than the products developed particularly for anaemia or for vitamin-A deficiency. BV

Vollmar (A) and Meuser (F). **Influence of starter cultures consisting of lactic acid bacteria and yeasts on the performance of a continuous sourdough fermenter.** *Cereal Chemistry* 69(1): 1992: 20-27

The performance of a newly developed, continuously operating sourdough fermentation system is dependent on the attainable metabolic activity of the microorganisms under the processing conditions. Of 8 pure cultures of lactic acid bacteria, one with *Lactobacillus brevis* ssp. Lindneri produced the best results, that is, a high, uniform formation of acids and a balanced proportion of acetic acid (23 - 33%) to total acid. Similarly good results were obtained with *L. fructivorans*. The performance of the fermenter can be improved and stabilized by adding starting cultures of yeasts isolated from sourdoughs. In the given fermentation time, fermenting sourdoughs with added yeast showed a significantly higher acid formation than did those without ( $P > 95\%$ ) added yeast. The accelerated acid formation was due almost entirely to additional production of acetic acid. This effect was independent of the strain of yeast. Yeast additions above a certain level had no further influence. AA

## Biscuits

Seibel (W), Brack (G), Hanneforth (U) and Sarhan (M). **Dietary fibre enrichment of biscuits.** *Getreide-Mehl und Brot* 45(9): 1991: 279-286 (De)



134

Yamada (Y) and Preston (KR). **Effects of individual oxidants on oven rise and bread properties of Canadian short process bread.** *Journal of Cereal Science* 15(3): 1992: 237-251

The effects of individual oxidants, including iodate, azodicarbonamide, ascorbic acid and bromate, on the oven rise and bread properties of Canadian short process bread have been studied using a straight grade Canadian red spring wheat flour. Addition of increasing levels of oxidant resulted in large increases in oven rise that corresponded closely with improvements in loaf vol. and bread score. Over-oxidation resulted in a loss of oven rise and corresponding decreases in bread quality. At optimum levels, all oxidants were equally effective in promoting oven rise and improving loaf vol. and bread score. Increased oven rise with increasing oxidation could be attributed to an increase in the time over which this process occurred. It is suggested that the increase in the time of oven rise associated with oxidation may, in addition to effects upon viscoelastic properties, be associated with an increase in the denaturation temp. of the gluten protein matrix supporting the gas cells. AA

135

Turk (M) and Sandberg (A-S). **Phytate degradation during breadmaking: Effect of phytase addition.** *Journal of Cereal Science* 15(3): 1992: 281-294

Bread was made using whole wheat flour and flour of 60% extraction, and inositol hexaphosphate and its hydrolysis products were measured by HPLC in both doughs and breads. Addition of a phytase preparation from *Aspergillus niger* to the doughs resulted in an increased degradation of phytate. When milk was included in the dough formulation, phytate degradation was inhibited almost completely, but fermented milk had no effect. Lactic acid, whether in the presence or absence of calcium chloride, inhibited phytate degradation, although when phytase was added phytate hydrolysis was complete. AA

136

Johnson (J) and Vickers (Z). **Sensory-specific satiety for selected bread products.** *Journal of Sensory Studies* 6(2): 1991: 65-79

The first 2 principal components selected out of 42 attributes scored by panel with 26 bread samples were designated as richness and nutrition/fibre dimensions were tested for their sensory-specific satiety in bread products. Panelists rated their liking before and after eating 400 calorie serving of

each sample and the measurements of hunger were also noted. The richness dimension did not affect the sensory-specific satiety and high nutrition/fibre dimension decreased hunger as well as liking. SD

137

Rasco (BA) and Dong (FM). **Baking and storage stability properties of high fibre breads containing comparable levels of different fiber ingredients.** *Journal of Food Processing Preservation* 15(6): 1991: 433-442

Mixing, baking and storage properties of high fibre (wheat bran, wheat distiller's grain, soybean, barley spent grain, or oat fiber) yeast breads (13% TDF as basis) varied widely. Bread samples containing wheat bran, wheat distiller's grain solubles and oat fibre retain softness better during storage at room temp. than the other high fibre breads. SD

138

Mettler (E), Seibel (W), Munzing (K), Fast (U) and Pfeilsticker (K). **Experimental studies on the effects of emulsifiers and gums in order to optimize the quality of wheat bread. Part 3. Analytical and rheological studies on the effects of emulsifiers during the baking procedures.** *Getreide-Mehl und Brot* 45(9): 1991: 273-279 (De)

139

Vohra (JC). **Baker's yeast and its role in bread making.** *Indian Baker* 23(3): 1992: 19-20

Baker's yeast increases dough vol. by evolution of CO<sub>2</sub> (leavening); develops structure and texture in the dough (dough maturing); improves flavour and nutritive value of the bread. SD

140

Carr (NO), Daniels (NWR) and Frazier (PJ). **Lipid interactions in breadmaking.** *CRC Critical Reviews in Food Science and Nutrition* 31(3): 1992: 237-258

The natural lipids of flour and added fats play an important role during bread production. In this review, the chemical and physical interactions of fat have been assessed in an attempt to explain these technological functions. Binding or complexing of lipid by flour proteins during the development of dough is emphasised. 164 references. SRA

141

He (H) and Hoseney (RC). **Factors controlling gas retention in nonheated doughs.** *Cereal Chemistry* 69(1): 1992: 1-6



When fully fermented and molded doughs made from 6 flours of differing baking quality were allowed to proof for an extended time, each dough expanded to its max. The max. dough proof height was highly correlated ( $r = 0.990$ ) to loaf vol. of bread produced by the same flours. Rheological study showed that the poor-quality flour dough was stiffer and less deformable under a constant stress than the good-quality flour. The gluten from poor-quality flour appeared to be easier to hydrate, more viscous, and less elastic than the good-quality gluten. However, doughs from the poor-quality flour were stiffer with less flow than doughs from the good-quality flour. Conclusions drawn from observations of the microscopic structure of optimally mixed dough indicated that the poor-quality gluten interacted strongly with starch granules. That interaction may decrease the flow properties of dough. Observations of the gas cells in fermenting dough from good-quality flour dough showed that they grew uniformly with time. However, in poor-quality flour dough, only a small number of cells enlarged, and most of the small cells expanded only slightly. The smaller flow properties of the poor-quality dough apparently did not allow the gas cells to expand at a rate fast enough to equalize the pressure. Thus, as the pressure in the cells increased, less  $\text{CO}_2$  diffused into the cells and more gas diffused to the atmosphere, which resulted in a smaller loaf. AA

142

He (H) and Hosney (RC). **Effect of the quantity of wheat flour protein on bread loaf volume.** *Cereal Chemistry* 69(1); 1992: 17-19

The effect of flour protein content on dough expansion and rate of  $\text{CO}_2$  loss from doughs during baking and extended proofing were studied. When baked in a conventional oven, the doughs containing more protein expanded at a faster rate than those containing less protein. Profiles of  $\text{CO}_2$  loss from doughs during baking were not significantly affected by flour protein contents above 8.5%. When proofed for an extended period, the doughs containing more protein expanded at a faster rate and, more importantly, continued to expand longer than the doughs containing less protein. The difference in dough expansion rate might be attributed to the effect of flour protein on dough extensibility. Calculation of the difference in thickness of gas cell walls between doughs containing 8.5 and 11.5% protein suggests that the extent of dough expansion is mainly determined by how thin the gas cell walls can be stretched before reaching their expansion limit. AA

## Dough

143

Kaufmann (B) and Kuhn (M). **Influence of additives on the rheology of doughs from whole wheat flours.** *Getreide-Mehl und Brot* 45(9); 1991: 269-273 (De)

144

Vollmar (A) and Meuser (F). **Optimisation of the productivity of a continuous sour dough fermentation.** *Getreide-Mehl und Brot* 45(11); 1991: 331-335 (De)

145

Lindahl (L) and Eliasson (A-C). **A comparison of some rheological properties of durum and wheat flour doughs.** *Cereal Chemistry* 69(1); 1992: 30-34

The rheological behaviour of doughs made from 3 commercial blends of wheat flours were compared. Two of the flours were wheat blends suitable for bread baking but milled quite differently. One was milled in the same way as the third, a durum wheat. The durum wheat flour contained 50% more protein than the 2 wheat blends and had a larger granulation after milling. The doughs were studied at 2 levels of water addition (35 and 45% mb) and analyzed in oscillation tests, and the elastic modulus and phase angle were measured. It was found that doughs of similar rheological behaviour could be obtained from flours differing considerably in protein content by manipulating particle size distribution and damaged starch content. A correlation between the elastic modulus and the amount of damaged starch was found when the level of starch damage was below 10%. The flours analyzed showed fairly good linear viscoelastic behaviour when limited strain values were applied and when the changes in the applied strain values with time were limited. AA

146

Hosomi (K), Nishio (K) and Matsumoto (H). **Studies on frozen dough baking. I. Effects of egg yolk and sugar ester.** *Cereal Chemistry* 69(1); 1992: 89-92

Improvements in the baking properties of frozen dough with egg yolk and sugar ester were studied by test baking, estimations of the gassing power and dough expansion, dough expansion test under decreased pressure, and surface membrane tension of thawed doughs after frozen storage for up to 3 wks. The observed effects of the additives were assumed to be brought about both by protection of yeast cells from damage and by prevention of dough proteins from denaturation by freezing, frozen storage, and thawing. AA



## Pasta

147

Giese (J). **Pasta: New twists on an old product.** *Food Technology* 46(2); 1992: 118-126

Different types of pasta (microwavable pasta, retortable pasta, unconventional pasta, diet oriented pasta and fanciful pasta), the ingredients, processes and packaging used to assemble such products as fresh pasta packaged in modified atm., pasta developed to withstand the rigors of retorting and microwave cooking and pasta that eliminates the need for boiling during preparation are described. CSA

## Spaghetties

148

Matsuo (RR), Malcolmson (LJ), Edwards (NM) and Dexter (JE). **A colorimetric method for estimating spaghetti cooking losses.** *Cereal Chemistry* 69(1); 1992: 27-29

The amount of residue in the cooking water is widely used as an indicator of cooked spaghetti quality. Traditional methods are time-consuming and in some instances give results that are difficult to reproduce. A quicker and more precise method was developed by reacting a clarified aliquot of cooking water with iodine and measuring the absorbance at 650 nm, the absorption max. for the amylose-iodine complex. Strong linear relationships ( $r^2 > 0.80$ ) were found between iodine absorption and cooking loss for both durum wheat and hard red spring wheat, indicating that cooking loss can be estimated reliably from iodine absorption values. AA

## Tortillas

149

Serna-Saldivar (SO), Rooney (LW) and Greene (LW). **Effects of lime treatment on the bioavailability of calcium in diets of tortillas and beans: Bone and plasma composition in rats.** *Cereal Chemistry* 69(1); 1992: 78-81

The properties and composition of femurs and plasma of weanling rats fed (for 8 wks) regular corn, raw grains of quality protein maize (QPM) or sorghum, or tortilla-based diets supplemented with and without Ca were determined. The femurs of rats fed tortillas weighed more; were thicker and longer ( $P < 0.05$ ); contained more ash, Ca, P, and Mg; and had less moisture and organic matter ( $P < 0.05$ ) than those of rats fed raw grains. Femurs of rats fed tortillas were denser ( $P < 0.05$ ) and at least 5 times stronger ( $P < 0.05$ ) than those of rats fed raw grains.

Among rats fed tortillas, QPM produced denser, stronger, longer, and thicker bones with more ash and Ca, followed by sorghum and regular corn tortillas. Supplementation of raw grain diets with Ca considerably improved the properties and mineral composition of the femur and serum Ca levels. These changes were not as marked when tortilla-based diets were supplemented with Ca. Serum Ca levels were approx. 30% lower for rats fed raw grains without supplemented Ca. Ca supplementation of QPM and sorghum tortillas had a marginal effect on serum Ca levels. Hypocalcemia was related to low serum albumin levels. Rats fed Ca-supplemented QPM products had the highest serum albumin levels ( $P < 0.05$ ), probably because of the improved dietary protein quality. AA

## MILK AND DAIRY PRODUCTS

### Milk

150

Patel (RS), Gupta (VK), Singh (S) and Retter (H). **Ultrafiltration behaviour of buffalo and cow milk.** *Indian Journal of Dairy Science* 45(6); 1992: 322-325

As the solids concn. in the retentate increased, there was a steady decrease in the flux rate regardless of milk systems studied. The drop in flux was a little faster in milk having 8% fat than milk having 3% fat and skim-milk 0.1% fat. The difference in permeate flux rate may be due to the higher viscosity of whole milk as compared to skim-milk. The UF concn. of buffalo milk had 6%, buffalo skim-milk 0.1%, cow milk 3.5% and cow skim-milk 0.1% fat. The max total solids was obtained in buffalo milk retentate (42.83%) whereas it was 25.70, 37.33 and 24.71% in buffalo skim-milk, cow milk and cow skim-milk respectively. The % reduction of mass in buffalo milk was 70.17, skim-milk 75.99, cow milk 79.17 and skim-milk 80.07%. The viscosity of buffalo whole and skim and cow whole and skim at 20°C was 51.985, 25.361, 34.432, and 23.432 at 42.83, 25.70, 37.33 and 24.71% respectively. SRA

151

Datta (AK). **Ultra-high-temperature sterilization of milk in India.** *Indian Food Industry* 11(2); 1992: 36-39

The paper presents an overview of 2 major problems on nutritional quality of UHT sterilized milk and the existence of fouling problem in the heat exchangers and deals with the examination of the thermal requirement of UHT sterilization of milk. CSA



Prasad (C) and Balachandran (R). **Chromatographic patterns of serum proteins of fresh and stored buffalo milk concentrates.** *Indian Journal of Dairy Science* 44(5): 1991: 333-347

Studies were conducted to elucidate the status of soluble proteins fractions obtained from freshly prepared and stored (30 and 37°C) sterilized buffalo milk concentrates by elution profile from chromatography through Sephadex G-100 column. Results of chromatographic profile revealed that at the manufacture only shifting in relative proportions of peak area took place which indicated the tendency towards coalescence at various levels of total solids (TS). But during storage at 25% TS level first coalescence took place which on further storage fragmented into smaller fractions. At higher temp. of storage and also at higher TS these changes were observed to be more. AA

153

Srivastava (MK) and Chopra (S). **Cost effectiveness in packaging - use of LLDPE film for milk packing.** *Packaging India* 25(1): 1992: 17, 19, 21-23

Use of linear low density polyethylene (LLDPE) film makes the pouch filling more cost effective and the advantages of using LLDPE film in achieving lesser percentage of leakage, shorter pouch length and significant downgaging in milk packing are discussed in this article. CSA

## Milk products

### Cheese

154

Pagliarini (E), Lembo (P) and Bertuccioli (M). **Recent advancements in sensory analysis of cheese.** *Italian Journal of Food Science* 3(2): 1991: 85-99

Recent advancements in sensory analysis of cheese are reviewed in this paper. By analysis of the sensory characteristics of various products, a list of attributes which can be used for all production lines are suggested and presented in an easily utilisable diagram. AA

155

Stratton (JE), Hutkins (RW) and Taylor (SL). **Biogenic amines in cheese and other fermented foods: A review.** *Journal of Food Protection* 54(6): 1991: 460-470

This review focuses on the importance of histamine and biogenic amines in cheese and other fermented foods. 101 references. BV

156

Lalic (LM) and Berkovic (K). **Storage time as a factor in determining physico-chemical parameters of new cheese products.** *Acta Alimentaria* 20(1): 1991: 19-24

Changes of physico-chemical parameters have been determined for the fresh prepared samples of new products based on fresh cottage cheese, semolina and eggs with adding of NaCl, cooked chopped spinach, hot red pepper, sucrose, vanilla, sugar and cinnamon, and for the samples stored at -14°C. At definite periods of time the changes in electroconductivity values, pH values, degree of acidity and texture of the prepared and stored samples during frying, were determined as well as products were checked for homogeneity. The amount of nitrate, nitrite and Fe was established in cooked spinach and in the samples with the addition of spinach and cottage cheese amounting to the wt. share of 25%. The samples of the new products, were shaped as 40 g biscuits, packed in small LDPE folio sacks, 50 µm thick, and stored at 259 K. They were analysed after 20, 40, 60 and 70 days, having previously reached the temp. of 20°C. AA

157

Tewari (BD) and Singh (S). **Cream cheese production - A review.** *Indian Journal of Dairy Science* 44(5): 1991: 348-351

This review article highlights the trend in cheese production, its importance in dairy industry, its potential for increasing production in India, simplification of manufacturing techniques and modifications of compositional attributes to suit consumers taste. 29 references. SRA

158

Litopoulou-Tzanetaki (E) and Tzanetakis (N). **Microbiological study of white-brined cheese made from raw goat milk.** *Food Microbiology* 9(1): 1992: 13-19

Results of this study suggest that lactic acid bacteria (*Lactobacillus plantarum*, *Lactococcus lactis*) predominate over the other microbial groups after 15 days of cheese ripening. Low pH levels (4.5) and high NaCl content (5.8 - 6.2%) after 75 days affected the growth of most microbial groups resulting in considerably lower counts at 3 months. Heterofermentative lactic acid bacteria at low levels in starter could be used to solve non-uniform quality, flavour abnormalities and texture problems. SRA



## Cheddar cheese

159

Jha (YK) and Singh (S). **Effect of higher ripening temperatures on flavour development in buffalo Cheddar cheese with and without cheese cloth.** *Indian Journal of Dairy Science* 45(6): 1992: 313-318

Higher ripening temp. accelerated flavour development in buffalo Cheddar cheese. Cheddar cheese ripened with and without cheese cloth at 8°C, 15°C for 3 wks, 15°C for 6 wks, 20°C for 3 wks and 20°C for 6 wks then transferred to 8°C for further ripening analysed for moisture losses, sensory characteristics and biochemical changes during 8 months of ripening. The moisture losses under standard conditions of curing (8°C and 78% RH) after 8 months was 4.66% which was reduced to 1.39% by paraffining cheese with cheese cloth. The moisture loss in cheese samples with and without cheese cloth ranged from 4.66 to 6.36% and 1.39 to 2.62% respectively at higher ripening temp. The cheese samples paraffined with cheese cloth and ripened at 15°C for 3 wks and 6 wks then transferred to 8°C showed acceleration in flavour development over cheese samples without cheese cloth. No beneficial role of higher ripening temp. (20°C) with cheese cloth on flavour was observed. AA

160

Guinee (TP), Wilkinson (MG), Mulholland (EO) and Fox (PF). **Influence of ripening temperature, added commercial enzyme preparations and attenuated mutant (Lac<sup>-</sup>) *Lactococcus lactis* starter on the proteolysis and maturation of Cheddar cheese.** *Irish Journal of Food Science and Technology* 15(1/2): 1991: 27-52

The effect of commercial enzyme preparations, in combination with freeze-shocked-lactose negative *Lactococcus lactis* subsp. *diacetylactis*, on the proteolysis, texture and flavour development in Cheddar cheeses ripened at 5, 10 or 15°C was examined over a 240-day maturation period. Enzymes, i.e. neutrase, FlavourAge-FR and lyophilized rennet (at different levels) were added to the curd at salting. Proteolysis increased with storage time and ripening temp.: of the enzymes evaluated Neutrase gave the highest levels of proteolysis as detected by N solubility in water, 75% ethanol and 5% phosphotungstic acid. FlavourAge-FR also accelerated proteolysis while increased levels of rennet gave proteolysis levels similar to those of the control cheese. The addition of the freeze-shocked mutant starter gave moderate increases in proteolysis (1-2%); a synergistic effect on proteolysis was noted between Neutrase and freeze-shocked starter. High levels of proteolysis (>

27% water soluble N), as effected by prolonged storage of cheese (> 128 days) at high temp. (> 10°C) and by the addition of Neutrase or FlavourAge-FR resulted in cheeses with defective texture (soft, brittle, adhesive) and flavour (bitter, soapy). AA

## Ghee

161

Bindal (MP) and Wadhwa (BK). **Renovation of rancid ghee.** *Indian Journal of Dairy Science* 44(5): 1991: 323-326

A simple and commercially viable method to enhance the shelf-life of poor shelf-lived renovated ghee by addition of BHA (0.02%) is described. The ghee showed a shelf-life very close to fresh ghee. SRA

## Paneer

162

Rao (KVSS), Zanjad (PN) and Mathur (BN). **Paneer technology - a review.** *Indian Journal of Dairy Science* 45(6): 1992: 281-291

Historical perspective, methods of production (traditional process, practices in the organized sector, upgradation of existing technology, process mechanization), factors affecting the quality of paneer (type of milk, quality of milk, heat treatment of milk, type of coagulant, strength of coagulant, amount of coagulant required, coagulation temp., pH of coagulation) yield of paneer, chemical composition, physico-chemical changes during paneer manufacture, microbiological quality, shelf-life, preservation of paneer, changes in paneer during storage (physico-chemical and microbiological changes, nutritive value) rheology of paneer, microstructure of paneer and priorities of future research are the aspects included in this review. 54 references. SRA

163

Ashraf Pal (M) and Yadav (PL). **Effect of blending buffalo and cow milk on the physico-chemical and sensory quality of paneer.** *Indian Journal of Dairy Science* 44(5): 1991: 327-332

Paneer (5 batches) prepared by blending buffalo and cow milk in the proportions of 1:0, 3:1, 1:1, 1:3 and 0:1 were evaluated for their quality characteristics. The blending of buffalo and cow milk showed a significant effect ( $P < 0.05$ ) on the % moisture, and total solids; and highly significant effect ( $P < 0.01$ ) on fat, ash on dry matter basis of paneer. Other physico-chemical (protein, lactose, Ca, P, total solids recovery, coagulant amount, moisture absorption,



titratable acidity and pH), sensory and whey characteristics elicited slight variations and were statistically non-significant. The results indicate that a good quality paneer can be prepared by blending buffalo and cow milk upto a ratio of 1:1. SRA

## Milk proteins

### Caseins

164

Madhava Rao (T), Jairem (BT), Reddy (RRRK) and Laxminarayana (M). **Studies on the quality of casein incorporated rennet curd (coagulum).** *Indian Journal of Dairy Science* 44(5); 1991; 358-359

The various physical and chemical properties of protein enriched curd prepared with the addition of acid casein is reported. Results indicated that the total protein content increased from 5.66 plus or minus 0.13 to 9.66 plus or minus 0.13. Rennet coagulation time decreased from 32.50 plus or minus 2.88 at 2% level to 19.16 plus or minus 0.87 min at 6% level of casein addition to milk. Higher content of casein decreased the rennet coagulation time. Addition of casein to milk improved the physical properties. Rennet curd with 4% addition of casein was moderately protein-rich and soft natured compared to 2 and 6% additions. SRA

## MEAT AND POULTRY

165

Sahu (BB) and Mahapatra (CM). **Poultry and meat processing as industry.** *Indian Food Industry* 11(1); 1992; 31-33

Aspects covered in this article are the prospects of meat processing, the industrial profile of meat food products, financing meat industry (large scale and rural), financial assistance schemes by nationalised banks and checklist for economic and technical feasibilities. CSA

### Meat

#### Pork

166

Yen (LC), Sofos (JN) and Schmidt (GR). **Effect of meat curing ingredients on thermal destruction of *Listeria monocytogenes* in ground pork.** *Journal of Food Protection* 54(6); 1991; 408-412

Ground pork (GP) (15% fat) inoculated with a mixture of 9 strains of *L. monocytogenes* ( $10^7$  -  $10^8$  CFU/g) was mixed with different levels of curing ingredients, filled into baby food jars (140 plus or minus 5 g/jar), and cooked in a waterbath to 60°C internal product temp. Heating rates were similar among meat treatments with different additives. However, destruction of *L. monocytogenes* was 3 log/g less in GP with 3% NaCl than in GP without added NaCl ( $P < 0.05$ ). The protective effect of NaCl against destruction of *L. monocytogenes* increased with increasing (0 - 3%) NaCl concn. Dextrose (1%) and phosphate mixture (0.4%) also protected *L. monocytogenes* ( $P < 0.05$ ) from thermal destruction. Sodium nitrite (0.0156%) and sodium erythorbate (0.055%) did not affect ( $P > 0.05$ ) the degree of thermal destruction of *L. monocytogenes* in GP. The greatest protective effect was observed when all curing ingredients were combined and added in GP. These results indicated that the chance for *L. monocytogenes* to survive during heat processing is greater in cured than in fresh meat. AA

### Products

167

Hung (SC) and Zayas (JF). **Sensory, chemical and bacteriological stability of frankfurters containing milk proteins and corn germ protein flour.** *Journal of Food Processing Preservation* 15(6); 1991; 413-431

168

Giese (J). **Developing low-fat meat products.** *Food Technology* 46(4); 1992; 100-108

A var. of techniques adopted to reduce or replace fat in making low-fat meat products (low-fat patties, sausages and frankfurters) are discussed. The cooking methods, effect of grind size, binders (carrageenan, soy proteins, oat bran, oat fiber, functional blends, maltodextrins and plant oil) and the additional ingredients (encapsulated salt and flavours) used in the development of low-fat patties and the mechanical methods used for removing fat and cholesterol (supercritical fluid extraction, separation process and microwave cooking pads) are explained. CSA

### Frankfurters

169

Buncic (S), Paunovic (L) and Radisic (D). **The fate of *Listeria monocytogenes* in fermented sausages and in vacuum-packaged frankfurters.** *Journal of Food Protection* 54(6); 1991; 413-417



In inoculated fermented sausages, the initial "most probable number" (MPN) of *L. monocytogenes* decreased from  $8 \times 10^6$ /g to  $1.1 \times 10^4$ /g during the production process. When the initial MPN was  $6.5 \times 10^2$ /g, *L. monocytogenes* were detected in finished sausages only when 25-g samples were used. The MPN of *L. monocytogenes* in finished experimental sausages remained constant during 20 days of storage at room temp. The av. number of lactobacilli in the experimental sausages was initially  $1.2 \times 10^7$ /g, reached  $8 \times 10^7$ /g after ripening, and decreased to  $2.2 \times 10^7$ /g in finished sausages. Sterilized filtrates of 12 *Lactobacillus plantarum* broth cultures produced zones of inhibition of *L. monocytogenes* growth on solid medium, when the pH of the filtrates ranged from 3.47 to 4.52. When the pH of the same filtrates was adjusted to 7.0, only slight zones of inhibition were registered with filtrates of 7 out of the 12 *L. plantarum* strains examined. In vacuum packages of surface-contaminated frankfurters, the MPN of *L. monocytogenes* increased from  $5 \times 10^2$  to  $2.1 \times 10^5$  per package during 20 days of storage at 4°C. In the same packages, the number of lactobacilli increased from  $2.4 \times 10^5$  to  $6.6 \times 10^9$  per package. AA

## Poultry

170

Zeitoun (AAM) and Debevere (JM). **Inhibition, survival and growth of *Listeria monocytogenes* on poultry as influenced by buffered lactic acid treatment and modified atmosphere packaging.** *International Journal of Food Microbiology* 14(2): 1991: 161-170

The effect of the treatment with various concn. (2, 5 and 10% w/v) of lactic acid/sodium lactate buffer (pH 3.0), modified atmo. packaging (MAP) (90% CO<sub>2</sub> and 10% O<sub>2</sub>) and 10% (w/v) lactic acid/sodium lactate buffer (pH 3.0) combined with MAP on *L. monocytogenes* Z7 serotype 1 and on the shelf-life of chicken legs stored at 6°C was investigated. The initial contamination level of *L. monocytogenes* on the chicken legs surface was  $8.3 \times 10^2$  cfu/cm<sup>2</sup> of skin. After 2 days of storage at 6°C the number of *L. monocytogenes* on legs treated with 2%, 5%, 10% lactic acid/sodium lactate buffer (pH 3.0) and 10% lactic acid/sodium lactate buffer (pH 3.0) combined with MAP was significantly lower than the initial number of *L. monocytogenes*. Later, growth of *L. monocytogenes* was observed. After 13 days of storage at 6°C the number of *L. monocytogenes* on legs treated with 10% lactic acid/sodium lactate buffer (pH 3.0) combined with MAP was still similar to the initial number. Legs treated with 2%, 5%, 10% lactic acid/sodium lactate buffer (pH 3.0), MAP and 10% lactic acid/sodium lactate buffer (pH 3.0) combined with MAP, have a shelf-life at 6°C of respectively 8, 9, 10, 13 and 17 days. This means a

prolongation of 2, 3, 4, 7 and 11 days, respectively for storage at 6°C. The antimicrobial effect of lactic acid buffer systems (pH 3.0) increased with increasing concn. of lactic acid in the buffered system. The best results were obtained by the combined use of 10% acid/sodium lactate buffer (pH 3.0) and MAP. AA

## Products

### Eggs

171

Germes (AC). **Decrease in lecithin-P<sub>2</sub>O<sub>5</sub> (egg yolk) content in industrially prepared egg noodles.** *Deutsche Lebensmittel-Rundschau* 87(10): 1991: 320-323

A significant (> 20%) decrease in lecithin-P<sub>2</sub>O<sub>5</sub> content in egg noodles during long-term storage was observed in only one out of 9 samples from different Western European countries and China, analysed by the Juckenack and the Dutch Noodle Order methods. Autoxidation of lecithin did not occur during production and storage, at least complex formation with protein or carbohydrates could not be demonstrated. Apparently, the high stability of egg yolk towards lipid oxidation, is maintained during normal production of egg noodles. Precooking of egg noodles might induce a decrease in lecithin-P<sub>2</sub>O<sub>5</sub> content due to an interaction of lecithin with wheat starch. The high drying temp. currently employed in egg noodle production, probably prevent enzymatic degradation of lecithin during storage. However, some degradation during production still seems possible. AA

## SEAFOODS

### Shrimps

172

Civera (T) and Parisi (E). **The use of sodium dodecyl sulphate polyacrylamide gel electrophoresis for the identification of raw and cooked shrimps and crabs.** *Italian Journal of Food Science* 3(2): 1991: 149-157

The effectiveness, reliability and limits of sodium dodecyl sulphate polyacrylamide gel electrophoresis for the sp. identification of raw and cooked crustacean sp., were evaluated. Several shrimp, prawn and crab samples were heated from 60 to 121°C and then analysed. The method was reliable for the identification of raw and cooked sp. treated up to 100°C, whereas most of the protein bands disappeared in canned seafoods. In cooked seafood,

sp. identification was performed using protein bands whose mol. wt. was no higher than 30 kiloDaltons. This procedure is particularly useful for pasteurized products. AA

## Fish

### Salmon

173

Rorvik (LM), Yndestad (M) and Skjerve (E). **Growth of *Listeria monocytogenes* in vacuum-packed, smoked salmon, during storage at 4°C.** *International Journal of Food Microbiology* 14(2): 1991; 111-118

Samples of smoked salmon of different hygienic quality were inoculated with low (6 cfu/g) and high (600 cfu/g) levels of a mixture of 3 strains of *L. monocytogenes*, after which they were vacuum-packed and stored at 4°C for up to 5 wks. *L. monocytogenes* grew well during storage in all the inoculated sample groups. Growth was, however, slightly faster in the fish with the better hygienic quality. The smoked salmon was still sensorically acceptable after 4 wks. All 3 strains were found after 4 wks in the fish with the better quality, while only 2 strains were recovered after the same time from the poorer quality salmon. AA

## Products

### Fish

174

Venugopal (V), Ghadi (SV) and Nair (PM). **Value added products from low-cost fish mince.** *ASEAN Food Journal* 7(1): 1992; 3-12

Briefly reviews the raw material, shelf-life, minced meat production by mechanical deboning, properties of minced meat, application of fish mince (traditional products, fish flour, fish protein hydrolysates, fermented products, fabricated foods - surimi and surimi-based products), extrusion cooked products, benefits of biotechnological applications, and industrial prospects. 103 references. SRA

## Crackers

175

Yu (SY). ***Oreochromis mossambicus* in fish crackers ('Keropok').** *ASEAN Food Journal* 7(1): 1992; 51

The combinations of *Oreochromis mossambicus* (a cheap fresh water fish species in Southeast Asia) to *Rastrelliger kanagurta* in 'Keropok' fish crackers (popular snack food in ASEAN) were analysed for sensory quality, moisture, protein, fat and ash contents. The % linear expansion was also calculated. 'Keropok' was acceptable upto a level of 60% substitution of *R. kanagurta* with *O. mossambicus*. Colour, crispness, flavour and overall acceptability were not significantly different. Above 60% level, acceptability of 'keropok' declined and scores obtained were significantly different for colour, flavour and overall acceptability. 'Keropok' containing increased levels of *O. mossambicus* showed higher protein content. No significant difference was observed for moisture, fat and ash contents. SRA

## Fish oil

176

Anon. **Fish oil consumption influences mortality rates of mice challenged with *Salmonella typhimurium*.** *Nutrition Reviews* 50(6): 1992; 173-175

## PROTEIN FOODS

Nil

## ALCOHOLIC AND NON-ALCOHOLIC BEVERAGES

### Alcoholic beverages

#### Beer

177

Simpson (WJ), Fernandez (JL) and Hammond (RM). **Differentiation of brewery yeasts using a disc-diffusion test.** *Journal of the Institute of Brewing* 98(1): 1992; 33-36

A simple test, based on the inhibitory effect of a range of compounds (cycloheximide, rhodamine 6G, brilliant green, 2, 3, 5 triphenyl tetrazolium chloride, ethidium bromide, Janus green) towards microorganisms, can be used to discriminate between brewery and brewery-associated yeast strains. Commercially available test discs are used for the tests but the manufacturers' conditions are modified to suit the growth requirements of brewery strains. The test is easy to perform and yields reproducible results. AA



Daoud (IS) and Kusinski (S). **Liquid CO<sub>2</sub> and ethanol extraction of hops. Part I: Effect of hop deterioration on extraction efficiency and extract quality.** *Journal of the Institute of Brewing* 98(1): 1992: 37-41

## Wines

179

Mateo (JJ), Jimenez (M), Huerta (T) and Pastor (A). **Contribution of different yeasts isolated from musts of Monastrell grapes to the aroma of wine.** *International Journal of Food Microbiology* 14(2): 1991: 153-160

Volatile substances of wines obtained by fermentation of musts from 'Monastrell' grapes (Alicante, Spain) was studied for yeast isolated from such musts. The results of the statistical treatment performed show that importance of yeasts of low fermentative power, particularly *Kloeckera apiculata*, in the production of volatile substances. *Saccharomyces cerevisiae* var. *chevalieri* was found to be the most important yeast of high fermentative power. AA

180

Peri (C), Malgarini (G), De Paola (M) and Pagliarini (E). **Deep-bed filtration of wine. I. Development of a novel experimental methodology.** *Italian Journal of Food Science* 3(2): 1991: 127-136

A novel bench-scale apparatus and an experimental procedure based on the evaluation of filtration curves under standard conditions and particle retention profiles in filter-aid precoat were set up to allow a more accurate study of deep-bed filtration to be made. By adding various clouding materials to a white-wine ultrafiltration-permeate, a series of filtration exp. was carried out using fine and coarse Kieselguhr precoat, both as such and as a 1:1 mixture. By determining the retention profiles it was possible to add valuable information to permeability and turbidity retention data. Moreover, surface and in-depth fouling phenomena, as well as particle bridging or plugging at critical pore size, were clearly pointed out. AA

181

Malgarini (G), De Paola (M), Pagliarini (E) and Peri (C). **Deep-bed filtration of wine. II. Modelling and optimisation of filtration rate.** *Italian Journal of Food Science* 3(2): 1991: 137-148

Precoat filtration exp. carried out on wines with different turbidities showed that there is a turbidity threshold beyond which bridging phenomena take

place and permeability becomes almost independent of sample turbidity. Only below this threshold do particles penetrate into the precoat, thus reducing plugging effects and sharply increasing into the precoat; thus reducing plugging effects and sharply increasing filter permeability. The detn. of retention profiles exhibited that the mechanism for particle capture depends upon both porosity of the filter and concn. of particles. Isotropic precoat with uniform porosity were found to be less efficient than anisotropic ones with a porosity gradient, especially when pore size decreased in the same direction of the filtrate flow (open side up). The wine filtration data were then fitted by using different kinetic equations (the cake filtration equation, the "power" equation and 3 equations relative to complete, intermediate and standard blocking). It was found that the "power" and "standard blocking" equations reconstructed the experimental data with the same degree of precision, regardless of the blocking mechanisms occurring in the filter medium. AA

## Non-alcoholic beverages

### Coffee

182

Cepeda (A), Paseiro (P), Simal (J) and Rodriguez (JL). **Contribution to spectrophotometry UV determination of caffeine in different types of coffees. I. Greens coffees and natural roasted coffees.** *Anales de Bromatologia* 42(2): 1990: 241-249 (Es)

A new UV spectrophotometry method for the detn. of caffeine contents in green grains and natural roasted coffee has been developed. Samples were clarified with light magnesium oxide. Extraction and purification were made using Sep Pak C18 cartridges. This method is simple, and rapid (in relation to AOAC Micro Bailey-Andrew method) and it is also reliable. It shows < 0.5 Cv%. Recovering average was 100%. It has also been studied the problem of background interferences resolution by the Morton and Stubb method and the second derivative method. The results agreed with those obtained by using Micro Bailey-Andrew method (AOAC). AA

183

Anon. **Regular or decaf? Coffee consumption and serum lipoproteins.** *Nutrition Reviews* 50(6): 1992: 175-178

Reviews the potential impact of caffeinated vs decaffeinated coffee on serum lipids. 19 references. GS



## Fruit juices

184

Crivaro (NO) and Fabeiro (MDC). **Determination of colouring matters in fruit juices and derivatives beverages. I. Quantitative analysis of Naranja A-1 (Food Yellow 3, E-110).** *Anales de Bromatologia* 42(2); 1990; 227-240 (Es)

185

Sapers (GM). **Control of enzymatic browning in raw fruit juice by filtration and centrifugation.** *Journal of Food Processing Preservation* 15(6); 1991; 443-456

Centrifugation at lower speed prevented browning in pear juice and apple (Granny Smith, Golden Delicious, Red Delicious) juice provided the foam was excluded. A method of preparation of non-browning cloudy apple juice by recombining heat-treated juice particulates with juice supernatant or ultrafiltration permeate is discussed. SD

## Cherry juices.

186

Sahin (S) and Bayindirli (L). **Assessment of the exponential model to sour cherry juice filtrations.** *Journal of Food Processing Preservation* 15(6); 1991; 403-411

Wine filtration (De La Garza and Boulton's model) simulated the data in the cake filtration of sour cherry juice. There was negative relation between filtration rate and resistance, forecasting and filtration rate and positive relation between filter aid dose and filtration rate. SD

## Grapefruit juices

187

Nagy (S), Rouseff (RL), Fisher (JF) and Lee (HS). **HPLC separation and spectral characterization of browning pigments from white grapefruit juice stored in glass and cans.** *Journal of Agricultural and Food Chemistry* 40(1); 1992; 27-31

A ternary solvent system consisting of water, acetonitrile, and tetrahydrofuran was used in HPLC to separate browning pigments formed in grapefruit juice stored in cans and bottles. Pigments were spectrophotometrically characterized using a photodiode array detector. HPLC runs evaluated at various storage times manifested different browning patterns with both the canned and bottled juices. Some compounds increased and then decayed with

time, whereas others continued to intensify. Late eluting components ( $R_t > 80$  min) were the most nonpolar browning pigments and, also, showed the most consistent HPLC patterns. HPLC patterns, retention times, and UV-vis spectra of browning components in canned juices were notably different from those of glass-packed juices. Most of the separated compounds exhibited absorbance maxima in the region 380 - 400 nm, and a value of 390 nm was ascertained by averaging all visible-absorbing maximums. No browning pigment had a distinct absorbance above 400 nm. The use of 390 nm to monitor nonenzymic browning of grapefruit juice is more appropriate than the current accepted value of 420 nm. AA

188

Crivaro (NO). **Determination of colouring matters in fruit juices and derivatives beverages. II. Quantitative analysis of tartrazine (E 120) in grapefruit beverages.** *Anales de Bromatologia* 42(2); 1990; 287-298 (Es)

## Orange juices

189

Crivaro (NO). **Determination of colouring matters in fruit juices and derivatives beverages. III. Quantitative analysis of both Naranja A-1 (Sunset Yellow FCF, E-110) and tartrazine (E-102) mixed in orange beverages.** *Anales de Bromatologia* 42(2); 1990; 377-391 (Es)

## Pineapple juices

190

Krueger (DA), Krueger (R-G) and Maciel (J). **Composition of pineapple juice.** *Journal of AOAC International* 75(2); 1992; 280-282

Some of the analytical data on the composition of pineapple juice is presented. Major and some minor constituents were determined for a series of fresh pineapple juices. Results include: soluble solids 11.2 - 16.2 g/100g, acidity (citric acid) 0.46 - 1.21 g citric acid/100 ml, fructose 1.72 - 4.75 g/100 ml, glucose 1.21 - 4.52 g/100 ml, sucrose 2.47 - 9.73 g/100 ml, citric acid 0.439 - 1.151 g/100 ml, malic acid 0.073 - 0.391, isocitric acid 80 - 265 mg/l, potassium 830 - 1410 mg/l, formol value 0.74 - 1.69 meq/100 ml, proline 11 - 44 mg/l, and carbon isotope ratio 13.5 - 11.2% PDB. Use of these compositional values in the detection of adulterated pineapple juice is discussed. BV



191

Desrosiers (T) and Clydesdale (FM). **Zinc and calcium solubility from instant tea and coffee with and without the addition of milk.** *Journal of Food Protection* 54(6): 1991; 451-453

The effect of tea and coffee, with and without milk, on the solubility of added Zn and Ca after a sequential pH change to 2 and 6 was investigated. The addition of milk did not decrease the solubility of endogenous Zn and Ca in tea but did in coffee. Liquid tea decreased ( $P < 0.01$ ) the solubility of added Zn but not of added Ca. However, the addition of milk to tea containing added Zn and Ca decreased ( $P < 0.01$ ) the solubility of both elements. This decrease reached a plateau after 100 or 150 ml of milk was added to 100 or 50 ml of tea, respectively. In coffee, when the minerals were added, the solubility of Zn did not depend on the presence of milk, whereas, the solubility of Ca decreased proportionally to the amount of milk added ( $P < 0.05$ ). AA

#### FATS AND OILS

192

Addo (K) and Pomeranz (Y). **Effects of lipids and emulsifiers on alveograph characteristics.** *Cereal Chemistry* 69(1): 1992; 6-12

The effects of lipids from hard red winter, durum, and commercial soft white winter flours of 12.9, 12.2 and 8.9% protein, respectively, on alveograph rheological dough properties of petroleum-ether (PE) defatted flours were determined. Alveograph parameters, significantly affected by PE defatting, could be restored by reconstitution of the flours. The source of flour lipids had no effect on the properties of reconstituted doughs. Defatting increased alveograph parameters P, W and DM and decreased L. Adding 2 or 4 times the amounts of free (PE-extracted) flour lipids beyond the level found in the original flour resulted in slight changes in alveograph characteristics of the reconstituted flour. Nonpolar lipids from the original flour, shortening (at a 2% level), linoleic acid, and (to a limited extent) linolenic acid were more effective in restoring alveograph characteristics of the defatted flour than were polar wheat flour lipids; corn, peanut, and palm oils; and palmitic, stearic, and oleic acids. Adding 2% shortening in combination with 0.2% lecithin, 0.2% hydroxylated lecithin, or 0.1% ethoxylated monoglycerides to the defatted flour made the doughs more similar in rheological properties to the original flour than adding shortening alone. AA

#### Fats

193

Elsner (A), Mieth (G) and Engst (W). **Sucrose fatty acid polyesters: Motives, possibilities and limits of application as fat substitutes in foods.** *Ernährungsforschung* 36(4): 1991; 126-132 (De)

The aim of the application of fat substitutes in high-caloric foods is the preventive and therapeutic effect on food-related diseases, in particular diseases of the coronary and cerebrovascular system. The large number of possible fat substitutes consists of native, digestible non-lipidic compounds with low energy value on the one hand, and synthetic, lipid-like non-digestible and therefore non-caloric compounds on the basis of fatty acid esters and ethers of polyols or polycarboxylic acids on the other. Among the pseudofats sucrose fatty acid polyesters are preferred because they may be synthesized according to the demands of food processing. Additionally, the properties can be varied, and biochemical behaviour is cleared up in principle. AA

194

El-Shattory (Y), Hegazy (S), Soliman (MM) and Aly (SM). **Heated fats. Part 3. Biological effect and effect of heating and tempering oils on fatty acid composition of liver, heart and serum lipids of rats.** *Die Nahrung* 35(10): 1991; 1007-1012

The results showed that the heated oils were generally more damaging to the organs of the rats than fresh fats. BV

195

Rohm (H) and Raaber (S). **Hedonic spreadability optima of selected edible fats.** *Journal of Sensory Studies* 6(2): 1991; 81-88

An untrained 33 students panel gave their hedonic preference to spreadability of butter, margarine, low fat products at different temp. Haake Kon consistometer measured cone penetration yield values under constant load. The results indicated that the preferred spreadability corresponded to 30 - 60 kPa yield value irrespective of the products. SD

196

Gopala Krishna (AG) and Prabhakar (JV). **Effect of water activity on secondary products formation in autoxidizing methyl linoleate.** *Journal of the American Oil Chemist's Society* 69(2): 1992; 178-183

The role of  $a_w$  on the formation of peroxides and carbonyl compounds during lipid oxidation is



important to know because there could be either beneficial or detrimental effects of  $a_w$  on lipid oxidation in stored foods. Therefore, methyl linoleate was chosen as a model lipid and was autoxidized to 1% at  $a_w$  ranging from 0.02 to 0.79 at 37°C. Oxygen uptake was monitored manometrically. The peroxide and carbonyl contents were determined upon termination of the autoxidation studies. Methyl linoleate autoxidation was characterized by three phases: i) an initial induction period of no oxygen absorption; ii) a slow rate of oxygen absorption, upto 0.15% oxidation; and iii) a relatively faster rate of oxygen absorption beyond 0.15% upto 1% oxidation.  $a_w$  had considerable influence during the first phase. There was no induction period at or below  $a_w$  0.22. The induction period begins at  $a_w$  0.32 and could be extended to a limit with increase in  $a_w$ . Once the induction period was passed  $a_w$  had no influence on the rate of oxidation. However, during the second and third phases  $a_w$  becomes important in the stabilization of peroxides/hydroperoxides and decides the course of secondary reactions that follow peroxide decomposition. Higher  $a_w$  values, particularly  $a_w$  0.67, tended to stabilize peroxides.  $a_w$  had considerable influence on the formation of secondary products of autoxidation as evidenced by the variation in the type and quantity of carbonyl compounds at different  $a_w$  values. AA

197

Bruhn (CM), Cotter (A), Diaz-Knauf (K), Sutherlin (J), West (E), Wightman (N), Williamson (E), Yaffee (M). **Consumer attitudes and market potential for foods using fat substitutes.** *Food Technology* 46(4); 1992; 81-82, 84, 86

Information on consumers' perception of high-fat foods and their attitudes toward lower-fat foods which incorporate fat substitutes (simplesse or olestra) is presented in this article. CSA

## Oils

198

Ledahudec (J) and Pokorny (J). **Effect of free fatty acids on the flavour of frying oil.** *Die Nahrung* 35(10); 1991; 1071-1075

Lauric acid imparts soapy taste to edible oil and to fried bread in the concn. of  $< \text{g.kg}^{-1}$ , palmitic acid and stearic acid taste neutral in the concn. of upto  $20 \text{ g.kg}^{-1}$  oleic acid is neutral in the same concn. range, while purified linoleic acid tastes slightly bitter, and the flavour of linolenic acid is bitter and rancid at the concn. of  $1 \text{ g.kg}^{-1}$ . AA

199

Ratnayake (WMN) and Pelletier (G). **Positional and geometrical isomers of linoleic acid in partially hydrogenated oils.** *Journal of the American Oil Chemist's Society* 69(2); 1992; 95-105

The geometrical and positional isomers of linoleic acid of a partially hydrogenated canola oil-based spread were isolated and identified. Through partial hydrazine reduction and mass spectral studies, *cis*-9, *trans*-13 octadecadienoic acid was identified as the major isomer. Other quantitatively important isomers characterized were *cis*-9, *trans*-9, *cis*-12 and *cis*-9, *cis*-15. These 4 were also the major isomers in margarine based on common vegetable oils. A number of minor isomers were detected and some structures identified were *trans*-9, *trans*-12; *trans*-8, *cis*-12; *trans*-8, *cis*-13; *cis*-8, *cis*-13; *trans*-9, *cis*-15; *trans*-10, *cis*-15 and *cis*-9, *cis*-13. The proportions of the various isomers are given for some margarines in the Canadian retail market. The amounts of *trans*-9, *trans*-12 isomer in Canadian margarines were generally below 0.5% of the total fatty acids. AA

200

Yoshida (H), Tatsumi (M) and Kajimoto (G). **Influence of fatty acids on the tocopherol stability in vegetable oils during microwave heating.** *Journal of the American Oil Chemist's Society* 69(2); 1992; 119-125

Effects of 0, 0.05, 0.25, 0.50 and 1.0% levels of fatty acids (caproic, caprylic, capric and lauric) or hydrocarbons (decane and dodecane) on tocopherol stability in vegetable oils during microwave heating were determined by measuring tocopherol losses and carbonyl and anisidine values. The fatty acids showed similar prooxidant activities toward tocopherols in purified vegetable oils when heated in a microwave oven. However, decane or dodecane, which had the same number of carbons as capric or lauric acid but no carboxylic group, did not show prooxidant activity. The shorter the chainlength and the higher the level of fatty acids, the greater was the reduction of tocopherols in the oils. The addition of low-mol. wt. fatty acids resulted in greater acceleration in the oxidation of tocopherols in the oils. The addition of low-mol. wt. fatty acids resulted in greater acceleration in the oxidation of tocopherols in the purified oils. Therefore, it is necessary to pay attention to these free fatty acids produced in the oils when heated in a microwave oven. AA

201

Forssell (P), Kervinen (R), Lappi (M), Linko (P), Suortti (T), Poutanen (K). **Effect of enzymatic interesterification on the melting point of**



**tallow-rapeseed oil (LEAR) mixture.** *Journal of the American Oil Chemist's Society* 69(2); 1992: 126-129

To reduce the melting point of a tallow-rapeseed oil mixture, the triglyceride composition of the mixture was altered by enzymatic interesterification in a solvent-free system. The interesterification and hydrolysis were followed by melting point profiles and by free fatty acid detn. The degree of hydrolysis was linearly related to the initial water content of the reaction mixture. The rate of the interesterification reaction was influenced by the amount of enzyme but not much by temp. between 50 and 70°C. The melting point reduction achieved by interesterification depended on the mass fractions of the substrates: the lower the mass fraction of tallow, the larger the reduction of the melting point. AA

202

Chong (CN), Hoh (YM) and Wang (CW). **Fractionation procedures for obtaining cocoa butter-like fat from enzymatically interesterified palm olein.** *Journal of the American Oil Chemist's Society* 69(2); 1992: 137-140

Solvent-free lipase-catalyzed incorporation stearic acid in palm olein by the 1,3-regiospecific Novo Lipase Lipozyme IM20 resulted in the formation of a complex mixture of fatty acid glycerides and free fatty acids. The stearyl incorporation in palm olein gave rise to the formation of 39.3% of the desired cocoa butter-like triglycerides in the fatty acid glyceride portion, namely distearoyl-oleoyl-glycerol (SOS), palmitoyl-oleoyl-stearoyl-glycerol (POS) and dipalmitoyl-oleoyl-glycerol (POP). A combination of fractionation steps involving initially the removal of free fatty acids (FFA) from the product mixture by steam distillation under vacuum, followed by fractional crystallization of the fatty acid-free glycerides in hexane and/or acetone, gave a fat, whose triglyceride composition and melting profile were comparable to that of cocoa butter as adduced by RP-HPLC and differential scanning calorimetry. The yield of the cocoa butter-like fat was approx. 25% of the wt. of the original palm olein. AA

203

Schwartz (DP) and Rady (AH). **Quantitation and occurrence of hydroxy fatty acids in fats and oils.** *Journal of the American Oil Chemist's Society* 69(2); 1992: 170-173

A relatively simple method is detailed for the routine quantitation and isolation of hydroxy fatty acid (HFA) in the glycerides of lipids. The lipid in cyclohexane is transmethylated in a 2-phase, 3.5 min procedure, and the hydroxyl compounds in the methyl ester fraction are derivatized with pyruvic

acid chloride 2,6-dinitrophenyl-hydrazone in the presence of triethylenediamine. The derivatives are fractionated on alumina, and the HFA fraction is evaluated spectrophotometrically. A large var. of animal, plant and marine lipids contains HFA in concn. ranging from < 10 to > 1000  $\mu$ moles/g lipid. The derivatives lend themselves admirably to purification techniques. A procedure for regenerating the parent HFA from the derivative is described. AA

204

Ratnayake (WMN). **AOCS method Ce 1c-89 underestimates the trans-octadecenoate content in favour of the cis isomers in partially hydrogenated vegetable oils.** *Journal of the American Oil Chemist's Society* 69(2); 1992: 192

205

Boki (K), Kubo (M), Wada (T) and Tamura (T). **Bleaching of alkali-refined vegetable oils with clay minerals.** *Journal of the American Oil Chemist's Society* 69(3); 1992: 232-236

The sepiolites (powder and spherule, Turkish origin) with more acid sites at  $-5.6 > H_0$  greater than or equal to  $-3.0$  were the most effective in bleaching of each alkali-refined oil (rapeseed, soybean, wheat germ, safflower, corn, cottonseed and sunflower). Surface area and acidity at  $-5.6 > H_0$  greater than or equal to  $-3.0$  were highly significant with bleaching efficiency. The sepiolites were more suitable than standard activated clay because they were more effective both in retaining tocopherols and in reducing free fatty acids after bleaching. BV

206

Elson (CE). **Tropical oils: Nutritional and scientific issues.** *CRC Critical Reviews in Food Science and Nutrition* 31(1/2); 1992: 79-102

Aspects covered in this review are: the influence of palm oil on sterol metabolism (human and animal), thrombus formation and experimental carcinogenesis role of triglyceride structure, influence of minor constituents of palm oil on sterol metabolism and experimental carcinogenesis. 180 references. BV

#### Coconut oils

207

Man (YC), Suhardiyono, Asbi Ali and Mohd Nasir Azudin. **Acetic acid treatment of coconut cream in coconut oil extraction.** *ASEAN Food Journal* 7(1); 1992: 38-42



Significant destabilization of the cream from coconut milk was obtained with 0.4% of 25% acetic acid treatment compared with lower levels (0.1 - 0.3%). The reaction times of acid treatment also affected the process. Recovery of oil (58 - 61%) was higher than the 30 - 40% obtained from traditional wet processing or the 50% reported for the Royal Tropical Institute of Amsterdam method. This alternative technique for removing oil from coconut meat, involving the use of acetic acid, is an improvement over traditional wet processing methods. SRA

#### Palm oils

208

Krisnangkura (K) and Simamaharnnop (R). **Continuous transmethylation of palm oil in an organic solvent.** *Journal of the American Oil Chemist's Society* 69(2); 1992: 166-169

Palm oil was transmethyated continuously at 70°C in an organic solvent with sodium methoxide as a catalyst. The optimum ratio of toluene to palm oil is 1:1 (v/v). When the methanol-to-oil molar ratio was 13:1, transmethylation was 96% complete within 60 sec. At higher molar ratio (17:1), transmethylation was 99% complete in 15 sec. For lower molar ratios of methanol-to-oil (9:1 and 5.8:1), yields of palm oil methyl ester (POME) were 84 and 58%, respectively. Benzene was also a good solvent for transmethylation, but the yield of POME was slightly lower than toluene. Tetrahydrofuran did not accelerate transmethylation. AA

209

Idris (NA), Abdullah (A) and Halim (AH). **Evaluation of palm oil quality: Correlating sensory with chemical analyses.** *Journal of the American Oil Chemist's Society* 69(3); 1992: 272-275

Palm oils of various qualities were used in this study. Chemical analyses included detn. of free fatty acids, peroxide value and *p*-anisidine value. Sensory evaluations included scoring and descriptive tests. Fresh, crude palm oil of high quality with a max. score showed a zero peroxide value, a zero *p*-anisidine value and a free fatty acid level of 0.2%. It had a strong, pleasant, sweet caramel-like flavour. The levels of free fatty acids were higher in samples that had been stored for a long time. Their *p*-anisidine values were also higher compared to fresh oils. Flavour intensity of red palm oil did not necessarily indicate quality. Its quality was dependent on the type of flavour, pleasant or otherwise. For refined, bleached and deodorized oil, there was an inverse relationship between flavour intensity and quality with a correlation coeff. of  $r = -0.87$ . There was some correlation between overall

rating by sensory method and quality evaluation by chemical analyses, such as free fatty acids ( $r = -0.69$ ), peroxide value ( $r = -0.57$ ) and *p*-anisidine value ( $r = -0.49$ ). AA

210

Ho (CC), Chow (MC) and Ong (SH). **Recovery of residual oil from the centrifuge sludge of a palm oil mill: Effect of enzyme digestion and surfactant treatment.** *Journal of the American Oil Chemist's Society* 69(3); 1992: 276-282

Residual oil recovery from the centrifuge sludge of a palm oil mill was investigated by treating with enzyme (Celluclast) followed by washing the digested substrate with surfactant. The optimal conditions for enzyme digestion with respect to pH, temp., reaction time, concn. of enzyme and surfactant were evaluated. The possible role of the surfactant in the oil recovery process is discussed. The chemical composition and physical properties of the sludge before and after treatment were determined and its significance in the subsequent effluent treatment/utilization of the sludge is discussed. AA

211

George (S) and Arumughan (C). **Lipid profile of process streams of palm oil mill.** *Journal of the American Oil Chemist's Society* 69(3); 1992: 283-287

During palm oil extraction, oil loss occurs mainly at 3 stages of processing, namely sterilization, pressing and clarification. Samples from a semi-commercial palm oil mill were analyzed for their lipid composition (triglycerol, diaacylglycerol, monoacylglycerol, free fatty acid, phospholipid and glycolipid contents and fatty acid compositions of these lipid classes) and compared with the end product, viz., raw palm oil. The results indicate significant variations between the samples with respect to oil quality and lipid profile. Data relating to the lipid classes showed that sterilizer condensate had the highest levels of free fatty acids (24%), followed by press fiber (12.5%) and sludge effluent (10.9%), as compared to raw oil (1.5%). Diacylglycerol and monoacylglycerol contents were also markedly higher for these streams. Press fiber was characterized by extremely high proportions of phospholipids and glycolipids. Distribution of fatty acids (16:0, 18:1, 18:2 and 18:3) also varied among lipid classes of the process streams, particularly between polar lipids. This paper discusses the compositional aspects of lipids relating to quality of oils of the palm oil mill streams. AA



## Sesame oils

212

Mukhopadhyay (SB), Gupta (PK) and Basu (AK). **Dry refining of sesame oil with alkali-enriched sodium metasilicate.** *Journal of the American Oil Chemist's Society* 69(3): 1992; 294

An easy method of refining sesame oil with alkali-enriched dry sodium metasilicate (SMS) is described. A significant reduction in free fatty acids (FFA) of the oil is observed. The extent of FFA reduction depends on the degree of the alkalinity of SMS-NaOH mixture. The method could be used for readily preparing low-FFA, medium-colour triglyceride oils that may find applications where the colour of final products does not pose a problem. BV

## Soybean oils

213

Neff (WE), Selke (E), Mounts (TL), Rinsch (W), Frankel (EN), Zeitoun (MAM). **Effect of triacylglycerol composition and structures on oxidative stability of oils from selected soybean germplasm.** *Journal of the American Oil Chemist's Society* 69(2): 1992; 111-118

The oxidative stability of soybean oil triacylglycerols was studied with respect to composition and structure. Crude soybean oils of various fatty acid and triacylglycerol composition, hexane-extracted from ground beans, were chromatographed to remove non-triacylglycerol components. Purified triacylglycerols were oxidized at 60°C, in air, in the dark. The oxidative stability or resistance of the substrate to reaction with oxygen was measured by detn. of peroxide value and headspace analysis of volatiles of the oxidized triacylglycerols (at < 1% oxidation). The correlation coeff. (r) for rates of peroxide formation ( $r = 0.85$ ) and total headspace volatiles ( $r = 0.87$ ) were related positively to oxidizability. Rate of peroxide formation showed a positive correlation with average number of double bonds ( $r = 0.81$ ), linoleic acid ( $r = 0.63$ ), linolenic acid ( $r = 0.85$ ). Rate of peroxide formation also showed a positive correlation with linoleic acid ( $r = 0.72$ ) at the 2-position of the glycerol moiety. A negative correlation was observed between rate of peroxide formation and oleic acid ( $r = -0.82$ ). Resistance of soybean triacylglycerols to reaction with oxygen was decreased by linolenic ( $r = 0.87$ ) and increased by oleic acid ( $r = -0.76$ ) containing triacylglycerols. Volatile formation was increased by increased concn. of linolenic acid at exterior glycerol carbons 1,3 and linoleic acid at the interior carbon 2. Headspace analysis of volatiles and HPLC of hydroperoxides indicated that as oxidation proceeded there was a slight decrease in the

linolenic acid-derived hydroperoxides and an increase in the linoleic acid-derived hydroperoxides. The oxidative stability of soybean oil triacylglycerols with respect to composition and structure is of interest to the development of soybean varieties with oils of improved odour and flavour stability. AA

214

Nourooz-Zadeh (J) and Appleqvist (L-A). **Isolation and quantitative determination of sterol oxides in plant-based foods: Soybean oil and wheat flour.** *Journal of the American Oil Chemist's Society* 69(3): 1992; 288-293

Soybean oil and wheat flour were analyzed for the content of sitosterol oxides. The method involved chromatography on a Lipidex-5000 column and enrichment on a disposable NH<sub>2</sub>-column, yielding a sterol fraction and a sterol oxide fraction. Each fraction was separated as trimethylsilyl-ethers on a methyl silicone capillary column. Analysis of crude and freshly refined soybean oil showed no detectable levels of the isomeric 5,6-epoxysitosterols, the epimeric 7-hydroxysitosterols and 5,6-dihydroxysitosterol at the detection limit of 0.2 p.p.m. Storage of a refined soybean oil for 1 yr at 4°C caused no significant increase in the level of free sitosterol oxides when compared to the freshly refined soybean oil. Analysis of 3 wheat flours (at 2, 8 and 36 months) revealed that the samples contained variable levels of 5 $\alpha$ ,6 $\alpha$ -epoxysitosterol (5.4 - 55 p.p.m. in the lipids), 5 $\beta$ ,6 $\beta$ -epoxysitosterol (0.2 - 29 p.p.m.), 7 $\alpha$ -hydroxysitosterol (9.3 - 118 p.p.m.) and 7 $\beta$ -hydroxysitosterol (9.7 - 126 p.p.m.). AA

## SPICES AND CONDIMENTS

### Spices

#### Coriandrum

215

Adhikari (S), Huq (F), Monowara Begum and Saha (G). **Studies on Coriandrum sativum Linn. Part II: Chemical investigation on coriander seed oil.** *Bangladesh Journal of Scientific and Industrial Research* 26(1-4): 1991; 33-40

GLC analysis of coriander seed oil showed presence of palmitic acid, petroselinic acid, oleic acid and linoleic acid as the major fatty acids. Lauric, myristic, myristoleic acid and palmitoleic acid were present in small amounts. TLC analysis of unsaponifiable matters showed presence of  $\beta$ -sitosterol. BV

## Dills

216

Blank (I), Sen (A) and Grosch (W). **Sensory study on the character - impact flavour compounds of dill herb (*Anethum graveolens* L.).** *Food Chemistry* 43(5): 1992: 337-343

Extract from fresh dill herb showed the presence of (s)- $\alpha$ -phellandrene as the character-impact compound of dill flavour while the contribution of myristicin, methyl 2-methyl butanoate and (R)-limonene to dill flavour appeared less significant. SD

## Marjoram

217

Tietz (U), Thomann (R) and Forstner (S). **High pressure extraction of marjoram. Part I. Sensory characterization of marjoram oleoresin by profile analysis.** *Die Nahrung* 35(10): 1991: 1013-1021 (De)

## SENSORY EVALUATION

218

Tepper (BJ), Mattes (RD) and Farkas (BK). **Learned flavour cues influence food intake in humans.** *Journal of Sensory Studies* 6(2): 1991: 89-100

Subjects, 28 normal-wt. adults, were trained to associate distinctly flavoured high or low calorie lunches with their post ingestive effects. 25% of them adjusted their daily food intake based on their acquired sensory experience after initially misled by changes in the flavour cues and the remaining subjects were not misled but maintained their intake. Sensory cues may control long-term food intake of individuals. SD

219

Belford (AL), Lindsay (RC) and Ridley (SC). **Contributions of selected flavour compounds to the sensory properties of maple syrup.** *Journal of Sensory Studies* 6(2): 1991: 101-118

Volatile compounds, furaneol, 2,5-dimethyl-4-hydroxy-3(2H)-furanone; sugar furanone, 4,5-dimethyl-3-hydroxy-2(5H)-furanone; guaiacol, 2-methoxyphenol; vanillin, 4-hydroxy-3-methoxy-benzaldehyde were found to contribute to maple flavour intensity by a descriptive panel. Sugar furanone was exceptionally important determinant as 5'-inosine mono phosphate in maple syrup. Consumer

preferred darker grade 4 syrups as more flavourable. SD

220

Buuren (S). **Analyzing time-intensity responses in sensory evaluation.** *Food Technology* 46(2): 1992: 101-104

Analysis of the time-intensity (TI) curves by the principal components which leads to the study of variation attributable to response patterns of judges is dealt in this article. The procedure involves the decomposing of TI curves into principal curves, variation in judges, analyzing principal curves and the contribution of individual curves. The results show that the variation caused by different judges overshadows the variability between products. CSA

221

Kemp (SE) and Birch (GG). **An intensity/time study of the taste of amino acids.** *Chemical Senses* 17(2): 1992: 151-168

Ten amino acids were assessed for sweetness, 11 for bitterness and 4 for both sweetness and bitterness. Limited relationships were found between chemical structure of the amino acids and their temporal properties. GS

222

Roy (G). **A review of sweet taste potentiation brought about by divalent oxygen and sulphur incorporation.** *CRC Critical Reviews in Food Science and Nutrition* 31(1/2): 1992: 59-77

Review. 129 references. SRA

## FOOD STORAGE

Nil

## INFESTATION CONTROL AND PESTICIDES

223

Dunaif (GE) and Krysinski (EP). **Managing the pesticide challenge: A food processor's model.** *Food Technology* 46(3): 1992: 72, 74-76

Approach that can be taken by the food industry to address the pesticide challenge using a number of methods integrated into a total systems approach to pesticide control is described. CSA



Miller (SA). **Novel foods: Safety and nutrition.** *Food Technology* 46(3); 1992: 114, 116-117

The fundamental analytical approach to the detn. of the wholesomeness of new and novel foods is discussed in this article. CSA

225

Caragay (AB). **Cancer-preventive foods and ingredients.** *Food Technology* 46(4); 1992: 65-68

The National Cancer Institute's five-year "designer foods" initiative which will provide new insights into the links between diet and cancer and firstly determine more precisely which foods and ingredients, alone and in combination offer significant cancer-preventive properties such as the role of phytochemicals present in common foods in preventing cancer in mankind and secondly to actually design foods with enhanced levels of those substances which may lead to the generation of entirely a new industry is discussed. CSA

226

Rajendran (S). **Selection for resistance to phosphine or methyl bromide in *Tribolium castaneum* (Coleoptera: Tenebrionidae).** *Bulletin of Entomological Research* 82(1); 1992: 119-124

The build-up resistance to phosphine and methyl bromide in the developmental stages of *Tribolium castaneum* (Herbst) after 6 selections in successive generation was investigated in the lab. at 25 plus or minus 1°C. Responses of the life stages of the fumigant-selected insects were compared with those of untreated controls with a 24 h exposure and mortality was assessed after 14 days. Phosphine induced the development of resistance irrespective of the life stage chosen for selection. The onset of phosphine resistance was noted after the first selection but the levels of resistance attained in the different stages varied depending on the stage tested, and in each case the degree of expression was different in the 4 stages of *T. castaneum*. After selection, phosphine resistance was highest in the pupae followed by eggs, adults and larvae. Resistance to methyl bromide in the methyl bromide treated insects increased only slightly ( $< \times 2.0$ ). Adults derived from egg, larva, pupa and adult selected methyl bromide lines showed cross-resistance to phosphine ( $\times 1.8$  to  $11.5$  at LD<sub>95</sub>), while cross-resistance of adults to methyl bromide was noted only in adult-selected phosphine-resistant insects ( $\times 1.5$  at LD<sub>95</sub>). AA

## BIOCHEMISTRY AND NUTRITION

227

Krusen (F). **Alternative forms of nutrition in view of food-technological assessment.** *Ernährungsforschung* 36(4); 1991: 116-121 (De)

Alternative forms of nutrition are based on agricultural products grown by use of alternative cultivation methods. Biological and ecological crop farming is actually desirable from the aspect of environmental burden and world nutrition. It particularly refers to the attempt to connect traditional ways with new approaches as it is fixed in the conception of "integrated plant cultivation". However, comparative studies on the quality of vegetable foods produced with both conventional or alternative methods did not indicate significant differences in the content of value-determining or value-lowering ingredients with significant impact on health which could be definitely proven by methods used in food chemistry. This does not apply to the nitrate content of alternative products which is remarkably lower as it has frequently been shown. AA

228

Petzke (KJ), Kozlovskaja (SG) and Grigorov (JG). **On the problem of nutrition and longevity: The role of energy intake and dietary fat.** *Ernährungsforschung* 36(4); 1991: 122-125 (De)

Life span and the processes of aging may be influenced by practical nutrition. This relation was especially clearly demonstrated in animal exp. using chronic food restriction resulting in a prolonged av. life span. The mechanisms for this effect remain to be elucidated. Some results suggest that a constrained adaptation of energy metabolism (economization) may be involved. The transfer of the results obtained with animals on human subjects is problematical by different reasons. Irrespective of this fact it will be advantageous to reduce energy consumption up to the requirement values considering an overnutrition in energy and fat of the av. western population. AA

229

Reichert (N) and Rubach (K). **Determination of biotin and folic acid in vitamin-containing foods by competitive binding protein assays (CBPA) and enzyme immunoassays (ELISA).** *Deutsche Lebensmittel-Rundschau* 87(11); 1991: 341-345 (De)

The paper describes the development and optimization of, in total, 5 different test procedures for the measurement of the vitamins, biotin and folic acid, based on CBPA and ELISA. Vitamin-Enzyme conjugates and a binding protein-enzyme conjugate were prepared for this purpose. Both naturally



occurring binding protein (avidin and streptavidin for biotin and the folate binding protein for folic acid) and commercially available antibodies were employed for the measurements, the tests developed were then compared with one another. Thus optimized, the assays were used to vitamin-containing foods and drinks, for example fruit juices, breakfast cereals, marmalade, or powdered drinks. AA

230

Notzold (H), Kretschmar (R) and Ludwig (E). **Contribution to the determination of protein hydrophobicity. Part 1. Determination of the hydrophobicity of selected cereal and milk proteins using their sodium dodecyl sulphate binding capacities.** *Die Nahrung* 35(9): 1991: 969-975 (De)

231

Notzold (H), Kretschmar (R) and Ludwig (E). **Contribution to the determination of protein hydrophobicity. Part 2. Determination of protein-bound sodium dodecyl sulphate using ultracentrifugation experiments.** *Die Nahrung* 35(9): 1991: 977-980 (De)

232

Anon. **How do foods affect folate bioavailability ?.** *Nutrition Reviews* 48(8): 1990: 326-328

The bioavailability of folates in foods varies; it is low for some foods that contain nutritionally important amounts of folate (e.g., legumes, orange juice, and tomatoes). Extracts of these foods significantly inhibited the activity of the intestinal enzyme that converts dietary polyglutamyl folates to the monoglutamyl form during absorption. AA

233

Gallaher (DD) and Schaubert (DR). **The effect of dietary fiber type on glycated hemoglobin and renal hypertrophy in the adult diabetic rat.** *Nutrition Research* 10(11): 1990: 1311-1323

The effect of various dietary fiber sources on glycated hemoglobin and renal hypertrophy, two long-term indicators of blood glucose control, was studied in diabetic rats. Streptozotocin-treated rats were fed a fiber-free diet or diets containing 8% dietary fiber, using one of the following fiber sources: cellulose, sugar beet fiber, beet fiber treated with calcium carbonate, oat bran, rye bran, barley bran flour, wheat bran, or guar gum. After 28 days, only guar gum-feeding reduced the % glycated hemoglobin relative to the fiber-free control group. Renal hypertrophy was seen in animals from all diabetic groups and was not diminished by any of the fiber

sources. In meal-fed animals there was no evidence of expansion of the intestinal contents vol. by feeding of any fiber source. Guar gum substantially increased the viscosity of the intestinal contents in 3 of 4 animals. The results are consistent with the use of purified, highly viscous fiber sources for improving glycemic control in insulin-dependent diabetes. AA

234

Shinjo (S), Asato (L), Arakaki (S), Kina (T), Kohrin (T), Mori (M), Yamamoto (S). **Comparative effect of casein and soybean protein isolate on body fat accumulation in adult rats.** *Journal of Nutritional Science and Vitaminology* 38(3): 1992: 247-253

Adult rats (300 g wt.) were fed 21% protein (casein or soy protein isolate (SPI)) and 5% oil diets by pair-feeding for 65 days in exp. I; and protein (25%) and oil 10% in exp. II. Final body wt. of the 2 dietary groups were similar in both exp. Total body fat was slightly lower in the SPI diet group than in the casein diet group in exp. II. Intra abdominal fat (IAF) was significantly lower in the SPI diet groups than in the casein diet groups in both exp. Serum lipid levels were greatly lower in the SPI diet group than in the casein diet group in exp. II. The results suggest that dietary SPI has the effect to lower the IAF accumulation as compared with casein. BV

235

Horwitz (W), Albert (R), Deutsch (MJ) and Thompson (JN). **Precision parameters of methods of analysis required for nutrition labeling. Part II. Macro elements - calcium, magnesium, phosphorus, potassium, sodium and sulphur.** *Journal of AOAC International* 75(2): 1992: 227-239

236

Ulberth (F) and Reich (H). **Gas chromatographic determination of cholesterol in processed foods.** *Food Chemistry* 43(5): 1992: 387-391

A precise and accurate GC method for the detn. of cholesterol in processed foods (sausages, mayonnaise, noodles, dressed fish sticks, Emmental cheese, dried soup and red cabbage meal), without prior total lipid extraction is described. The accuracy and precision of the method was assessed by using a BCR reference material (anhydrous butter fat). The method being comparable to enzymatic assay showed an analyte level of 267.8 plus or minus 1.78 mg for anhydrous butter fat and 59.1 plus or minus 2.46 for frankfurter sausages. SD



Tee (E-S). **Carotenoids and retinoids in human nutrition.** *CRC Critical Reviews In Food Science and Nutrition* 31(1/2): 1992: 103-163

This review covers a wide range of topics on 2 closely related compounds (carotenoids and retinoids). Emphasis is given to the functions of these compounds and their roles in human nutrition. Various aspects of vitamin A deficiency and studies on carotenoids and retinoids in cancer development and prevention are reviewed. 237 references. SRA

238

Boutton (TW), Lynott (MJ) and Bunsted (MP). **Stable carbon isotopes and the study of prehistoric diet.** *CRC Critical Reviews In Food Science and Nutrition* 30(4): 1991: 373-385

The use of carbon isotopes as a tool for investigating the introduction and relative importance of corn in the diet of prehistoric humans in the eastern part of North America is focused in this article. Aspects covered are: the basis of carbon isotope technique, description of study samples, sample preparation and mass spectrometric analysis, amino acid profiles of bone collagen, isotopic evidence for maize agriculture in Missouri/Arkansas, carbon isotope variation in an isochronous prehistoric human population, problems and limitations, and future prospects for stable isotopes in archaeology. 50 references. SRA

239

Turnlund (JR). **Bioavailability of dietary minerals to humans: The stable isotope approach.** *CRC Critical Reviews In Food Science and Nutrition* 30(4): 1991: 387-396

Minerals in foods are essential for humans, animals, and/or plants. The bioavailability of dietary minerals are considered to determine the diet contents. By using stable isotope (SI) tracers as labels, the metabolic fate of minerals in a specific day's diet, a specific meal, or a food can be distinguished from minerals from other sources and followed. A number of MS methods are used to measure SI. Magnetic sector, thermal ionization MS is used in the lab to study bioavailability of Zn, Cu and Fe. One of the major advantages of SI studies is that multiple isotopes of the same mineral can be used and multiple minerals can be studied simultaneously. The method can be used in food science and nutrition. 7 references. SRA

240

Pham (CB), Galvez (FCF) and Padolina (WG). **Methionine production by batch fermentation**

**from various carbohydrates.** *ASEAN Food Journal* 7(1): 1992: 34-37

The fermentation conditions for microbial production of methionine using *Corynebacterium glutamicum* ATCC 21608 were optimized in shake flasks on a lab. scale with initial pH 7.0 at 30°C and 150 rev/min rotary rate. An inoculum age of 16 - 24 h and rate of 1% (v/v) were most favourable for methionine synthesis. A 20% vol. ratio (vol. of medium: vol. of flask) was optimum. Of the 4 sugar sources (sugarcane juice, molasses, banana and cassava) tested, molasses diluted by coconut water to give 250 g/l sugars proved optimum for methionine production, giving 3.6 g/l after 96 h of fermentation. Ammonium sulphate was the optimum N<sub>2</sub> source (2% w/v) for methionine production. SRA

## TOXICOLOGY

241

Abbott (PJ). **Carcinogenic chemicals in food: Evaluating the health risk.** *Food and Chemical Toxicology* 30(4): 1992: 327-332

Reviews the synthetic chemicals in food present either as specific additive or as contaminants derived from environmental chemicals, which are potentially carcinogenic. The mechanisms by which mutagenic chemicals initiate cancer and the level of human exposure to these chemicals are reviewed in detail. GS

242

Abbott (PJ). **Carcinogenic chemicals in food: Evaluating the health risk.** *Food and Chemical Toxicology* 30(4): 1992: 327-332

The presence of a low level of potentially harmful chemicals (synthetic or natural) in food continuous to be a concern in many individuals. This paper reviews some of the issues in the light of recent developments in carcinogenic risk assessment with the aim of arriving at a balanced view of food safety, particularly with regard to carcinogenic risk. Aspects covered are: chemicals and human cancer, definition of term 'carcinogen', natural and synthetic carcinogens in food, natural defence system, current testing for carcinogenic chemicals, threshold dose level for carcinogens and identification of carcinogenic risk factors. 32 references. BV

243

Hall (RL). **Toxicological burdens and the shifting burden of toxicology.** *Food Technology* 46(3): 1992: 109-112

Natural toxicants, in the context of public health concerns and the safety of modified food sources are discussed. The relevance of natural toxicants to food, the harm it causes to humans, the methods employed to reduce the level of risks caused by the toxicants and the need to revise the means for evaluating food safety are dealt. CSA

244

Ellis (WO), Smith (JP), Simpson (BK) and Oldham (JH). **Aflatoxins in food: Occurrence, biosynthesis, effects on organisms, detection and methods of control.** *CRC Critical Reviews in Food Science and Nutrition* 30(4); 1991: 403-439

## FOOD LAWS AND REGULATIONS

245

Crawford (LM). **International food safety regulations: Improving the Codex Alimentarius process.** *Food Technology* 46(2); 1992: 98, 100

Changes have been recommended for Codex Alimentarius process so that it can more effectively influence the international approaches to food regulation. CSA

246

Wehr (HM). **Pesticide residue regulations and the Pacific rim.** *Food Technology* 46(3); 1992: 77-79

Pesticide regulations that currently exist within the Pacific rim, (Japan, Taiwan and South Korea); discussions on some of the influences that exist within the Pacific rim; directions that Japan, Taiwan and South Korea are taking with respect to pesticide

residue regulation; and strategies for reducing pesticide-related problems on exported food products are focussed in this article. CSA

247

Labuza (TP) and Baisler (W). **The role of the federal government in food safety.** *CRC Critical Reviews in Food Science and Nutrition* 31(3); 1992: 165-176

248

Hotchkiss (JH). **Pesticide residue controls to ensure food safety.** *CRC Critical Reviews in Food Science and Nutrition* 31(3); 1992: 191-203

The adequacy of controlling agricultural pesticides to minimize risks are critically reviewed in this article. Aspects covered are: risks from pesticides, role of the agrochemical industry, role of pesticide users and applicators, role of the food manufacturing and retail industries, role of government in regulating pesticides, criticisms, problems and reforms, and existing problems. 42 references. SRA

249

Pariza (MW). **Risk assessment.** *CRC Critical Reviews in Food Science and Nutrition* 31(3); 1992: 205-209

Describes the risk assessment process, some of the shortcomings, and the assurances of risk assessment applied to food safety evaluation, food safety priorities, evolution of risk, assessment in food safety, mechanics of risk assessment, uncertainty in risk assessment, interpreting risk assessments and future directions are highlighted in this article. 19 references. SRA



# AUTHOR INDEX

- Abbott (PJ)  
241 242
- Abdel-Kader (ZM)  
26
- Abdullah (A)  
209
- Abraham (G)  
59
- Abraham (TE)  
32
- Achariyaviriya (S)  
118
- Addo (K)  
192
- Adegoke (GO)  
98
- Adhikari (S)  
215
- Agarwal (K)  
52
- Aguilar (F)  
128
- Ahmed (R)  
81
- Akanni (AO)  
98
- Albert (R)  
235
- Alka Sharma  
84
- Alonso (G)  
115 116
- Alur (MD)  
8
- Aly (SM)  
194
- Andrews (SB)  
58
- Apintanapong (M)  
78
- Appleqvist (L-A)  
214
- Arakaki (S)  
234
- Artho (A)  
6
- Arumughan (C)  
211
- Asato (L)  
234
- Asbi Ali  
207
- Ashraf Pal (M)  
163
- Asp (N-G)  
24
- Babalola (AK)  
98
- Baisier (W)  
247
- Balachandran (R)  
152
- Bansilal (CV)  
32
- Barlow (PJ)  
28
- Basu (AK)  
212
- Bayindirli (L)  
186
- Belford (AL)  
219
- Ben-Shalom (N)  
97
- Berkovic (K)  
156
- Bern (CJ)  
75
- Berry (SK)  
1
- Bertuccioli (M)  
154
- Bessar (BAA)  
109
- Beuchat (LR)  
42
- Bhandari (MV)  
99
- Bhat (AN)  
99
- Bhumiratana (S)  
110
- Bhupinder Kaur  
129
- Bibi (N)  
87
- Biedermann (M)  
6
- Bindal (MP)  
161
- Bindu (C)  
36
- Birch (GG)  
221
- Blank (I)  
216
- Boki (K)  
205
- Boros (D)  
53
- Boutton (TW)  
238
- Brack (G)  
133
- Brackett (RE)  
42
- Braddock (RJ)  
114
- Bradley (DG)  
15
- Bressani (R)  
101
- Bruemmer (JH)  
96
- Bruhn (CM)  
197
- Brummer (J-M)  
63
- Buchanan (RL)  
35
- Buncic (S)  
169
- Bunsted (MP)  
238
- Buranasilpin (P)  
105
- Burdock (GA)  
51
- Bushuk (W)  
54
- Buuren (S)  
220
- Cadwallader (KR)  
114
- Cairns (T)  
17
- Campanella (L)  
47
- Caragay (AB)  
225
- Caramaschi (A)  
6
- Cardozo (MS)  
25
- Carr (ME)  
127
- Carr (NO)  
140

Cepeda (A)	180 181	Fabeiro (MDC)
182	DeVries (JW)	184
Chakrabarti (J)	24	Farkas (BK)
52	Debevere (JM)	218
Champagne (ET)	170	Faruque (O)
59	Delgado de Layno (M)	81
Chan (HTJr)	94	Fast (U)
119	Delwiche (SR)	138
Chaudry (MA)	69	Fernandez (JL)
87	Desai (NB)	177
Chauhan (GS)	46	Fernandez (M)
18	Desrosiers (T)	30
Chen (J-F)	191	Fisher (JF)
126	Deutsch (MJ)	187
Chitnawasarn (S)	235	Fletcher (SM)
105	Dexter (JE)	82
Chong (CN)	148	Fleuriet (A)
202	Diaz (O)	113
Chopra (S)	30	Ford (L)
153	Diaz-Knauf (K)	41
Choquevilca (YC)	197	Ford (RA)
104	Dong (FM)	51
Chow (MC)	137	Forni (E)
210	Dornbos (DLJr)	86
Chusanatasana (K)	89	Forssell (P)
78	Dorner (JW)	201
Civera (T)	71	Forstner (S)
172	Doyle (MP)	217
Clydesdale (FM)	33	Fox (PF)
191	Dunaif (GE)	160
Concha (AIR)	223	Fox (TL)
104	Duriyaprapan (S)	42
Cordatore (M)	105	Frankel (EN)
47	Eckhoff (SR)	213
Cotter (A)	76	Frazier (PJ)
197	Edwards (NM)	140
Crawford (LM)	148	Fuchs (M)
245	El-Shattory (Y)	4
Crivaro (NO)	194	Furda (I)
184 188 189	Eliasson (A-C)	24
Crivelli (G)	145	Gallaher (DD)
86	Ellis (WO)	233
Crosbie (GB)	244	Galvez (FCF)
62	Elsner (A)	240
Czukur (B)	193	Garcia de Fernando (GD)
93	Elson (CE)	30
Daniels (NWR)	206	Gelroth (JA)
140	Engst (W)	66
Daoud (IS)	193	George (S)
178	Enwere (NJ)	211
Datta (AK)	82	Germes (AC)
151	Eskin (NAM)	171
Dave (RI)	18	Ghadi (SV)
46	Espita (E)	174
De Paola (M)	103	



Ghezzi (M)	141 142	Jane (J-L)
86	Hegazy (S)	126 128
Giese (J)	194	Jara (EV)
147 168	Henick-Kling (T)	104
Gilmour (RF)	37	Jay (JM)
62	Henninger (M)	31
Glaser (BK)	22	Jesudas (DM)
66	Hermoza (GC)	117
Glaser (D)	104	Jha (YK)
19	Hildebrand (DF)	159
Glatz (BA)	2	Jimenez (M)
75	Hill (AS)	179
Glenn (GM)	70	Johnson (J)
67	Hiramatsu (M)	136
Gopala Krishna (AG)	92	Johnson (LA)
196	Ho (CC)	73 74 75 79
Gram (L)	210	Johnston (RK)
34	Hoh (YM)	67
Greene (FE)	202	Julsrigival (S)
23	Hojilla-Evangelista (MP)	106
Greene (LW)	79	Kabirullah (M)
149	Holmstrom (K)	81
Grigorov (JG)	38	Kachru (RP)
228	Horvath (E)	9
Grob (K)	93	Kailasapathy (K)
5	Horwitz (W)	111
Gromes (R)	235	Kajimoto (G)
19	Hoseney (RC)	200
Grosch (W)	141 142	Kalinowski (LS)
216	Hosomi (K)	104
Guinee (TP)	146	Karim (MNA)
160	Hotchkiss (JH)	120
Gupta (PK)	248	Karunanithi (R)
212	Hron (RJSr)	117
Gupta (PP)	59	Kauffman (CS)
65	Huerta (T)	100 107
Gupta (VK)	179	Kaufmann (B)
102 150	Huidobro (JF)	143
Halim (AH)	124	Kazemie (M)
209	Hung (SC)	54
Hall (RL)	167	Kemp (SE)
243	Huq (F)	221
Hammes (WP)	215	Kemsley (EK)
37	Hutkins (RW)	27
Hammond (RM)	155	Kervinen (R)
177	Idris (NA)	201
Hammouri (MK)	209	Khan (SA)
27	Jagadeesh (A)	81
Hanneforth (U)	14	Kim (AH)
133	Jairem (BT)	41
Harinder (K)	164	Kim (S)
129	Jamuna (R)	127
Hay (RL)	32 36	Kina (T)
68	Jamuna	234
He (H)	131	

Kluge (S)	201	Mahendrapandian (S)
4	Lareo (L)	5
Kohrin (T)	85	Mahoney (RR)
234	Laxminarayana (M)	61
Korany (K)	164	Maki (Z)
109	Ledahudec (J)	60
Kornegay (J)	198	Malcolmson (LJ)
85	Lee (HS)	148
Kothari (RM)	187	Malgarini (G)
125	Lee (JL)	181
Kozlovskaja (SG)	112	Man (YC)
228	Lembo (P)	120 207
Krause (J-P)	154	Mandhar (SC)
83	Levi (A)	112
Kretschmar (R)	97	Marcondes (JA)
230 231	Li (BW)	112
Krieger (SA)	25	Mateo (JJ)
37	Lindahl (L)	179
Krishnaiah (MM)	145	Mathur (BN)
10	Lindsay (RC)	162
Krishnappa (KG)	219	Matsumoto (H)
10	Linko (P)	146
Krisnangkura (K)	201	Matsuo (RR)
208	Litchfield (JB)	148
Krueger (DA)	72	Mattes (RD)
190	Litopoulou-Tzanetaki (E)	218
Krueger (R-G)	158	Matusik (J)
190	Lopez de ogara (MC)	71
Krusen (F)	94	Mauromoustakos (A)
227	Lozano (JS)	58
Krysinski (EP)	124	Mazzei (F)
223	Ludwig (E)	47
Kubo (M)	230 231	McKellar (RC)
205	Luikkonen (KH)	50
Kuhn (M)	55	McWatters (KH)
143	Lund (ED)	82
Kulkarni (PR)	96	Melton (LD)
108	Lynott (MJ)	111
Kumar (KR)	238	Mettler (E)
123	Ma (C-Y)	138
Kumar (VNG)	50	Meuser (F)
99	Macchi (RA)	132 144
Kusinski (S)	94	Mieth (G)
178	Macheix (J-J)	193
Laakso (SV)	113	Mikle (H)
55	Maciel (J)	6
Labuza (TP)	190	Miller (SA)
247	Madhava Rao (T)	224
Lalic (LM)	164	Miller-Ihli (NJ)
156	Madhwaraj (MS)	23
Lambe (WJ)	5	Min (DB)
62	Maga (JA)	15
Lanher (BS)	80	Minagawa (M)
21	Mahapatra (CM)	29
Lappi (M)	165	



Mistry (AH)	125	Pelletier (G)
76	Nishio (K)	199
Mizutani (H)	146	Peri (C)
29	Noomhorm (A)	181
Mohamed (AI)	110	Peri (CMalgariniG)
90	Norris (KH)	180
Mohd Nasir Azudin	69	Peterson (RE)
207	Notzold (H)	95
Monowara Begum	230 231	Peterz (M)
215	Nourooz-Zadeh (J)	39
Montfoort (A)	214	Petzke (KJ)
55	Nowak (J)	228
Morales (E)	91	Pfeilsticker (K)
101	Nyanzi (FA)	138
Mori (A)	80	Pham (CB)
92	Ohlson (R)	240
Mori (M)	88	Phillips (JG)
234	Oldham (JH)	35
Mouat (CH)	244	Pilosof (AM)
58	Olsen (JE)	94
Mounts (TL)	38	Pinto (R)
213	Olszyna-Marzys (AE)	97
Mukherjee (A)	3	Piringer (O)
52	Ong (SH)	4
Mukhopadhyay (SB)	210	Pitt (RE)
212	Ordonez (JA)	69
Mulholland (EO)	30	Plat (D)
160	Pacheco (RA)	97
Mullen (RE)	104	Pokorny (J)
89	Padolina (WG)	198
Muniategui (S)	240	Polesello (A)
124	Pagliarini (E)	86
Munzing (K)	154 180 181	Pomeranz (Y)
138	Pal Singh (R)	192
Mushtari Begum (J)	64	Posner (ES)
131	Palumbo (SA)	66
Myers (DJ)	35	Poutanen (K)
79	Paquet (A)	201
Nagarajan (L)	50	Prabhakar (JV)
44	Pardo (F)	196
Nagy (S)	115 116	Prasad (C)
187	Parisi (E)	152
Nail (BV)	172	Preston (KR)
42	Pariza (MW)	134
Nair (PM)	48 249	Prosky (L)
8 174	Paseiro (P)	24
Narpinder Singh	182	Raaber (S)
64 65 129	Pastor (A)	195
Navarro (G)	179	Raczynska-Bojanowska (K)
115 116	Patel (RS)	53
Navarro (JP)	150	Radisic (D)
104	Patmayothin (N)	169
Neff (WE)	110	Rady (AH)
213	Paunovic (L)	203
Nehete (PN)	169	

Raeker (MO)	38	Schmidt (G)
75	Rouseff (RL)	83
Rahayu (K)	187	Schmidt (GR)
43	Roy (G)	166
Rajendran (S)	222	Schnellbacher (B)
226	Ruari (R)	19
Ramakrishna (SV)	72	Schultz (M)
32 36	Rubach (K)	20 83
Ramanajaneya (KH)	229	Schulze (J)
119	Rubbi (SF)	121 122
Ramesh (A)	81	Schwartz (DP)
11	Ruter (M)	203
Ramsay (M)	4	Schweizer (TF)
61	Rybka (K)	24
Ramunsri (W)	53	Seibel (W)
78	Saguy (I)	63 133 138
Rangappa (M)	40	Seifert (A)
90	Saha (G)	20 83
Rangaswamy (K)	215	Sekhon (KS)
117	Sahin (S)	64 65 129
Ranhotra (GS)	186	Selke (E)
66	Sahu (BB)	213
Rao (KVSS)	165	Sen (A)
162	Salil Seghal	216
Rasco (BA)	84	Senthong (C)
137	Salinas (MR)	106
Rasmussen (OF)	115 116	Serna-Saldivar (SO)
38	Sanchez-Marroquin (A)	149
Ratnayake (WMN)	101	Shah (DN)
199 204	Sancho (MT)	125
Razagui (IB)	124	Shah (NK)
28	Sandberg (A-S)	125
Reddy (RRRK)	135	Shankar (V)
164	Sapers (GM)	125
Reich (H)	185	Shen (L)
236	Sapis (J-C)	128
Reichert (N)	113	Shinjo (S)
229	Sardjono	234
Retter (H)	43	Shutton (KH)
150	Sarhan (M)	68
Richardson (PS)	133	Siebenmorgen (TJ)
12	Satish (HS)	53
Ridley (SC)	5	Siegmund (EG)
219	Sattar (A)	17
Rinsch (W)	87	Simal (J)
213	Sattig (B)	182
Rodriguez (JL)	19	Simamaharnnop (R)
182	Sautiago (LA)	208
Rohm (H)	92	Simpson (BK)
195	Schaubert (DR)	244
Rooney (LW)	233	Simpson (WJ)
149	Schmandke (H)	177
Rorvik (LM)	20 83	Singh (HP)
173	Schmidt (A)	■
Rossen (L)	13	



Singh (MD)	118	Van Beem (J)
112	Tashiro (M)	85
Singh (S)	60	Venugopal (V)
150 157 159	Tatsumi (M)	174
Singhal (RS)	200	Vickers (Z)
108	Taufik	136
Sinha (LK)	120	Vijayendraraao (AR)
130	Taylor (SL)	5
Skerrit (JH)	155	Vinh (PQ)
70	Tee (E-S)	8
Skjerve (E)	237	Vohra (JC)
173	Tepper (BJ)	139
Smith (JP)	218	Vollmar (A)
244	Tewari (BD)	132 144
Sofos (JN)	157	Volpe (G)
166	Thakar (PN)	47
Soliman (MM)	46	Wada (E)
194	Thanaboripat (D)	29
Soponronnarit (S)	78	Wada (T)
118	Thomann (R)	205
Srivastava (AK)	217	Wadhwa (BK)
65	Thompson (JN)	161
Srivastava (MK)	235	Wang (C)
153	Tietz (U)	73 74
Stanley (KD)	217	Wang (CW)
127	Timba (D)	202
Stewart (KK)	102	Watanakul (J)
49	Tiyawalee (D)	105
Stratton (JE)	106	Wehr (HM)
155	Tkachuk (R)	246
Streng (K)	18	West (E)
20	Tomassetti (M)	197
Sudarmadji (S)	47	Westoo (A)
43	Trivedi (MK)	39
Suhardiyono	7	Whitfield (FB)
207	Trucksess (MW)	16
Suortti (T)	71	Wightman (N)
201	Tsutsui (H)	197
Sutherlin (J)	62	Wilkinson (MG)
197	Turk (M)	160
Suwendu Bhattacharya	135	Williams (AC)
45	Turnlund (JR)	35
Swaminathan (KR)	239	Williamson (E)
117	Tzanetakis (N)	197
Szabo (AS)	158	Wilson (CM)
109	Ulberth (F)	77
Szebiotko (K)	22 236	Wilson (RH)
91	Umesh-Kumar (S)	27
Tamura (T)	44	Wivutvongvana (P)
205	Upadhyay (CM)	106
Tanpanich (S)	125	Wolf (WJ)
105	Urano (T)	95
Tansakul (A)	71	Wolff (E)
110	Vaidehi (MP)	4
Tasaso (P)	131	

Wood (PJ)  
56  
Yadav (PL)  
163  
Yaffee (M)  
197  
Yamada (Y)  
134  
Yamamoto (S)  
234  
Yen (LC)  
166

Yndestad (M)  
173  
Yoon (KJ)  
127  
Yoshida (H)  
200  
Yu (SY)  
175  
Zaika (LL)  
41  
Zanjad (PN)  
162

Zayas (JF)  
167  
Zeitoun (AAM)  
170  
Zeitoun (MAM)  
213  
Zhuo (L)  
27  
Zunft (H-J)  
121 122



# SUBJECT INDEX

- Acceptability**  
baked products, acceptability of Fe/vitamin A enriched 131
- Acetic acid**  
coconut oil, coconut cream acetic acid treatment & extraction of 207
- Achras sapota**  
see Sapota
- Acrylamide**  
starch, extrusion & acrylamide polymerisation onto 127
- Acrylonitrile**  
starch, extrusion & acrylonitrile polymerisation onto 127
- Additives**  
dough, additives & rheology of whole wheat flour 143
- Aeromonas**  
perches, spoilage *Aeromonas* inhibition in 34
- Aeromonas hydrophila**  
temp./pH/NaNO<sub>2</sub>/NaCl aerobic growth of *A. hydrophila* 35
- Aflatoxin B<sub>1</sub>**  
lufin/gari, aflatoxin B<sub>1</sub> sodium metabisulphite/hydrogen peroxide/heating effect in 98
- Aflatoxins**  
*Asp. flavus*, *Asp. oryzae* & growth/aflatoxin production by 43 corn, NaCl/propionic acid/ammonium hydroxide & aflatoxin production in 78 foods, aflatoxins in 244
- Aging**  
honeys, aging in stored 124
- Agricultural products**  
drying & post-harvest losses in agricultural products 9
- Air**  
foods, air role in 1
- Akara**  
consumer response to cowpea paste akara 82
- Amaranthus**  
evaluation/screening of Thailand *Amaranthus* 105 germplasm development of *Amaranthus* 103 grain *Amaranthus* germplasm screening in Thailand 106 grain *Amaranthus* research in Peru 104 grain *Amaranthus* status in 1990's 107 grain amaranth 100 grain *amaranthus* cvs, chemical composition of 101 grain *amaranthus* cvs, processing & nutritional quality of 101 grain *amaranthus*-Kenyan 102
- Amaranthus paniculatus starch**  
cross-linked *Amaranthus paniculatus* starch 108
- Amines**  
cheese/fermented foods, biogenic amines in 155
- Amino acids**  
time/intensity & taste of amino acids 221
- Ammonium hydroxide**  
corn, ammonium hydroxide & *Asp. flavus* growth/aflatoxin production in 78
- $\alpha$ -Amylases**  
*Bacillus*, thermostable  $\alpha$ -amylase synthesis by 36
- Amylopectins**  
starch, amylopectin & pasting properties of 126
- Amyloses**  
starch, amylose & pasting properties of 126
- Analysis**  
agricultural/food products, quantitative computerized analysis of 21 food web analysis, isotopes for 29
- Anethum graveolens**  
see Dill
- Antigenicity**  
*Saccharomyces cerevisiae*, antigenicity of flocculating 44
- Antimicrobial activity**  
foodborne pathogens, fatty N-acyl amino acids antimicrobial activity against gram-positive 50
- Appearance**  
peas, freezing/storage & appearance of 86
- Apple juices**  
filtration/centrifugation & enzymatic browning control in raw apple juices 185
- Apples**  
packaging & transport of apples 112
- Aroma**  
wines, yeasts & aroma of 179
- Aromatic compounds**  
wines, carbonic maceration & aromatic compounds in Monastrell grape 115 116
- Aseptic packaging**  
papaya puree, deoxygenation-enzymatic of aseptically packed stored 119
- Aspergillus flavus**  
*Asp. oryzae* & growth/aflatoxin production by *Asp. flavus* 43 corn, NaCl/propionic acid/ammonium hydroxide & *Asp. flavus* growth in 78
- Aspergillus niger**  
glucoamylases, *Asp. niger* & synthesis of 32
- Aspergillus oryzae**  
*Asp. flavus*, *Asp. oryzae* & growth/aflatoxin production 43
- Atomic absorption spectroscopy**  
foods/biological materials, chromium detn. AAS in 23
- Bacillus**  
 $\alpha$ -amylase synthesis by *Bacillus* 36
- Bacterial quality**  
frankfurters, bacterial stability of milk proteins/corn germ protein flour based 167
- Bactris gasipaes**  
see Pejibaye palm 128
- Bakery products**  
acceptability/storage of Fe/vitamin-A enriched baked products 131 soy flour use in bakery products 130
- Baking**  
bread, fibres & baking/storage stability of high fibre 137 dough, egg yolk & baking of frozen 146 wheat, baking quality of 63 wheat, kernel wt. & baking performance of 68
- Baking properties**  
wheat, baking properties of Karnal bunt infected 64 wheat-chickpea flour blends, baking properties of 129
- Barley**  
bread, barley & baking/storage stability of high fiber 137
- Beans**  
Ca bioavailability in lime treated beans 149 *Phaseolus vulgaris* (Nuna), nutritive value of 85
- Beverages**  
naranja A-1 detn. in beverages 184

**Bioavailability**

- beans/tortillas, Ca
- bioavailability in lime treated 149
- dietary minerals bioavailability to human 239
- folates, bioavailability of 232

**Biological values**

- wheat, biological values of
- Karnal bunt infected 65

**Bioreactors**

- extruder as bioreactors 45

**Biotechnology**

- dairy/food industries, biotechnological approaches to 46
- fatty acid improvements in plants & biotechnology 2
- microbial aspects of biotechnology food products 48
- safety of biotechnological food products 49

**Biotin**

- foods, biotin detn. in
- vitamin-containing 229

**Biscuits**

- dietary fibre enrichment of biscuits 133
- soy flour use in biscuits 130

**Blanching**

- carrots, pH & pectic substances/firmness of blanched 97

**Bread**

- emulsifiers & rheological properties of bread 138
- fatty acids & flavour of bread 198
- fibers & baking/storage stability of high fiber breads 137
- oxidants & oven rise/properties of Canadian short process bread 134
- products, sensory-specific satiety for selected bread 136
- soy flour use in bread 130
- wheat flour protein & loaf vol. of bread 142

**Breadmaking**

- baker's yeast in breadmaking 139
- lipid-interaction in breadmaking 140
- phytases & phytase degradation during breadmaking 135
- wheat flour protein content & dough expansion/gas retention during breadmaking 142

**Brown rice**

- rice products, ethanol for stabilized brown 59

**Browning**

- grapefruit juices, browning

**pigments HPLC**

- separation/spectrophotometric characterization from stored 187
- grapes/wines, phenolic compounds & browning of 113

**Buffalo milk**

- paneer, buffalo/cow milk & quality of 163
- ultrafiltration behaviour of buffalo's milk 150

**Butter**

- fats, cholesterol detn. GC in butter 236
- hedonic preference & spreadability of butter 195

**By-products**

- citrus by-products manufacture for food use 114

**Cabbages**

- meal, cholesterol detn. GC in red cabbage 236

**Caffeine**

- coffees, caffeine spectrophotometric UV detn. in green/roasted 182

**Cakes**

- soy flour use in cakes 130

**Calcium**

- analysis method for Ca 235
- beans/tortillas, Ca bioavailability in lime treated 149
- tea/coffee, Ca solubility in instant 191

**Cancer**

- foods/ingredients for cancer prevention 225

**Canned foods**

- grapefruit juices, browning pigments HPLC separation/spectrophotometric characterization from canned 187

**Carbohydrates**

- fermentation-batch & methionine production from carbohydrates 240

**Carcinogenicity**

- foods, health hazard & carcinogenic chemicals in 241
- foods, health risk & carcinogenic chemicals in 242

**Carotenoids**

- nutrition, carotenoids in human 237

**Carrot sticks**

- sesquiterpene hydrocarbons in processed stored carrot sticks 96

**Carrots**

- pH & pectic substances/firmness of blanched carrots 97

**Caseins**

- body fat accumulation in albino rats & caseins 234
- rennet curd & quality of casein 164

**Cassava products**

- lufan/gari, aflatoxin B<sub>1</sub> sodium metabisulphite/hydrogen peroxide/heating effect in 98

**Celluloses**

- moisture content/water activity NIR sensitivity in celluloses 69

**Centrifugation**

- fruit juices, centrifugation & enzymatic browning control in raw 185

**Cereal products**

- air role in cereal-based food products 1

**Cereals**

- diet, nutritional values of Bangladesh cereal-pulse 81
- grains, undigestible in vitro components of cereal 53

**Cheddar cheese**

- ripening temp. & flavour development in buffalo Cheddar cheese 159
- ripening temp. & proteolysis/maturation of Cheddar cheese 160

**Cheese**

- biogenic amines in cheese 155
- cholesterol detn. GC Emmental cheese 236
- cream cheese production 157
- microbial quality of goat milk based white-brined cheese 158
- products, storage time & physico-chemical properties of cheese 156
- sensory analysis of cheese 154

**Chemical properties**

- cheese products, storage time & chemical properties of 156

**Cherry juices**

- filtration of sour cherry juices 186

**Chickpea flour**

- wheat-chickpea flour blends, functional/baking properties of 129

**Chilling**

- perches, chilling & spoilage Aeromonas inhibition in 34

**Cholesterol**

- processed foods, cholesterol detn. GC in 236

**Chromatography**

- milk concentrates, serum proteins chromatography of fresh/stored



- buffalo 152
- Chromium**
  - foods/biological materials, chromium detn. AAS in 23
- Citrus**
  - by-products from citrus for food use 114
- Citrus oils**
  - citrus by-products 114
- Coconut oils**
  - coconut cream acetic acid treatment & extraction of coconut oil 207
- Coconuts**
  - coconut oil, coconut cream acetic acid treatment & extraction of 207
- Coffee**
  - caffeine spectrophotometric UV detn. in green/roasted coffees 182
  - instant coffee, Zn/Ca solubility in 191
  - serum lipoproteins & coffee consumption 183
- Colorimetry**
  - spaghetti, cooking loss colorimetric estimation for 148
- Colour**
  - peas, freezing/storage & colour of 86
- Colourants**
  - naranja A-1 detn. in fruit juices/beverages 184
  - tartrazines quantitative analysis in grapefruit juices 188
- Competitive binding protein assays**
  - foods, biotin/folic acid detn. ELISA in vitamin-containing 229
- Computers**
  - agricultural/food products, quantitative computerized analysis of 21
- Confectionery**
  - packaging of confectionery 123
- Conglycinin**
  - corn starch/soy protein blends, processing temp. &  $\beta$ -conglycinin in extrusion-cooked 80
- Consumers**
  - cowpea paste akara, consumer response to 82
  - fat substitute foods, consumer attitudes for 197
- Contamination**
  - metal contamination, blenders & clean-up procedure to reduce trace 28
- wheat, contamination detection rapid tyrosinase test for durum 61
- Cooking**
  - faba beans, cooking & antinutritional factors of 84
  - solar water pre-heater for cooking 14
  - spaghetti, cooking loss colorimetric estimation for 148
- Coriander seed oils**
  - GLC analysis of coriander seed oils 215
- Corn**
  - cyclopiazonic acid LC detn. in corn 71
  - kernels, water distribution/mobility detn. NMR during steeping of corn 72
  - milling-dry/physical characteristics of alkali-debranned yellow dent corn 76
  - NaCl/propionic acid/ammonium hydroxide & Asp. flavus growth/aflatoxin production in corn 78
  - propionate & preservation of high-moisture corn 75
  - protein characterization from flaked/defatted whole corn 79
  - starch/gluten quality of propionate-treated high-moisture milled corn 74
  - yield/composition of propionate-treated high-moisture milled corn 73
- Corn flour**
  - frankfurters, properties of milk proteins/corn germ protein flour based 167
- Corn oils**
  - clay minerals & bleaching of alkali-refined corn oils 205
- Corn proteins**
  - frankfurters, properties of milk proteins/corn germ protein flour based 167
  - protein characterization from flaked/defatted whole corn 79
- Corn starch**
  - amylose/amylopectin & pasting properties of corn starch 126
  - blends, processing temp. & proteins in extrusion-cooked corn starch/soy protein 80
  - starch quality of propionate-treated high-moisture milled corn 74
- Cow milk**
  - paneer, buffalo/cow milk & quality of 163
  - ultrafiltration behaviour of cow's milk 150
- Cowpea pastes**
  - akara, consumer response to 82
- Crabs**
  - SDS-PAGE identification of raw/cooked crabs 172
- Crackers**
  - fish, crackers *Oreochromis mossambicus* in 175
- Curd**
  - casein, rennet curd & quality of 164
- Curing**
  - pork, meat curing ingredients & *L. monocytogenes* thermal destruction in ground 166
- Dairy industries**
  - biotechnological approaches to dairy industries 46
- Degradation**
  - breadmaking, phytases & phytate degradation during 135
- Degumming**
  - rapeseed oils, degumming of 88
- Detergents**
  - tomatoes, detergents & lindane residues in 109
- Diabetics**
  - dietary fiber effect on diabetic rat hemoglobin/renal hypertrophy 233
- Dibenzyl ether**
  - safety evaluation of dibenzyl ether 51
- Dietary fibres**
  - biscuits, dietary fibres enrichment of 133
  - bread, fibre & baking/storage stability of high fiber 137
  - diabetic rat hemoglobin/renal hypertrophy, dietary fibre effect on 233
  - foods/food products, dietary fibre detn. in 24
  - fruits/vegetables, dietary fibre nonenzymatic-gravimetric detn. in 25
  - lactose, dietary fibre effects of 122
  - lactose-dietary fibre & microbial activity 121
- Diets**
  - carbon isotopes & prehistoric diets 238
- Digestibility**
  - cereal grains, undigestible in vitro components of 53

**Dills**

Anethum graveolens, flavour compounds of 216

**Diseases**

wheat, properties of Karnal bunt infected 64

**Dough**

breadmaking, wheat flour protein content & dough expansion/gas retention during 142  
egg yolk/sugar ester & baking of frozen dough 146  
gas retention in non-heated doughs 141  
sour sough fermentation, productivity optimization of continuous 144  
wheat flour dough, additives & rheology of whole 143  
wheat flour dough, rheological properties of 145

**Doughnuts**

soy flour use in doughnuts 130

**Dried foods**

soups, cholesterol detn. GC in dried 236

**Drying**

agricultural products, drying & post-harvest losses in 9  
papaya glaze, drying of 118

**ELISA**

foods, biotin/folic acid detn.  
ELISA in vitamin containing 229

**Egg products**

noodles, lecithin-P<sub>2</sub>O  
5 in industrially prepared egg 171

**Egg yolks**

dough, egg yolk & baking of frozen 146  
noodles, lecithin-P<sub>2</sub>O  
5 in industrially prepared egg 171

**Electrodes**

plant tissue electrode & phosphate detn. in foods 47

**Electrophoresis**

shrimps/crabs, SDS-PAGE  
identification of raw/cooked 172

**Emulsifiers**

bread, emulsifiers & rheological properties of 138  
wheat flour, emulsifiers & alveograph characteristics of 192

**Emulsions**

food emulsions, protein concn. & stability of 20

**Enzymes**

food industries & enzymes 46  
foods, nitrate level detn.

enzymatic in 19

palm oil mill-centrifuge sludge, enzyme treatment & residual oil recovery from 210

tallow-rapeseed oil mixtures, enzymatic interesterification & melting point of 201

**Equipments**

filling device for retort pouch 5  
food processing machinery 11  
grains, equipments for intake of high quality 13  
pulper-finisher specifications & characteristics of tomato juices 110

**Ester**

dough, sugar ester & baking of frozen 146

**Ester gums**

genotoxicity of ester gums 52

**Esterification**

tallow-rapeseed oil mixtures, enzymatic interesterification & melting point of 201

**Ethyl alcohol**

rice products, ethanol for stabilized brown 59

**Extraction**

hop deterioration effect on extraction efficiency/extract quality & liquid CO<sub>2</sub>  
extraction/ethanol 178  
marjoram, extraction-high pressure of 217  
processed foods, fatty acid extraction from 22  
wheat flour, lithium chloride & extraction of 54

**Extruders**

bioreactors, extruders as 45

**Extrusion**

corn starch/soy protein blends, processing temp. & proteins in 80  
starch, extrusion & methacrylate/acrylamide/  
acrylonitrile monomers  
polymerization onto 127

**Faba beans**

Vicia faba, processing/cooking & antinutritional factors of 84

**Fababean proteins**

acylated fababean globulins & pectin/protein interactions in o/w emulsions 83

**Fats**

casein/soy proteins & body fat accumulation in albino rats 234  
hedonic preference & spreadability of fats 195  
hydroxy fatty acids in fats 203

nutrition/longevity, dietary fat & problem of 228

palm olein, fractionation procedures for cocoa butter-like fat from enzymatically interesterified 202

substitute foods, consumer attitudes/market potential for fat 197

substitutes, sucrose fatty acid polyester as fat 193

**Fats animal**

meat products, low-fat 168

**Fatty acids**

composition, oil heating effect on rat organ fatty acid 194  
coriander seed oils, fatty acids in 215  
foodborne pathogens, fatty N-acyl amino acids antimicrobial activity against gram-positive 50  
oils, fatty acids & flavour of frying 198  
oils, fatty acids & tocopherol stability in microwave heated vegetable 200  
oils/fats, hydroxy fatty acids in 203  
plants, fatty acid metabolism alteration in 2  
processed foods, fatty acid composition  
extraction/methylation method detn. in 22  
soybeans, drought/temp. & proteins/oil contents of 89  
soybeans, fatty acids in 90  
sucrose fatty acid polyester as fat substitutes 193

**Fermentation**

carbohydrates, batch fermentation & methionine production from 240  
dough fermentation, productivity optimization of continuous sour 144  
grapes, wine volatile substances by fermentation of Monastrell 179  
soy sauce/kecap, Asp. oryzae & Asp. flavus aflatoxin control during fermentation of 43  
tempeh fermentation, soybean/pea biochemical changes during 91

**Fermented foods**

biogenic amines in fermented foods 155

**Fibres**

citrus by-products 114  
wheats, fiber content of air-classified white flour from hard/soft 66



**Filling**

retort pouch, filling device for 5

**Filtration**

fruit juices, filtration & enzymatic browning control in raw 185

sour cherry juices, filtration of 186

wines, deep-bed filtration in 180 181

**Firmness**

carrots, pH & firmness of blanched 97

**Fish oils**

mortality rates of mice & fish oil consumption 176

**Fish products**

cholesterol detn. GC in dressed fish sticks 236

crackers, *Oreochromis mossambicus* in fish 175

fish mince-low-cost 174

**Flavonoids**

citrus by-products 114

**Flavour**

bread, baker's yeast & flavour of 139

Cheddar cheese, ripening temp. & flavour development of 159

food intake in humans & flavour cues 218

oils, fatty acids & flavour of frying 198

peas, freezing/storage & flavour of 86

**Flavour compounds**

dill herbs flavour compounds of 216

maple syrups, flavour compounds & sensory properties of 219

**Folates**

bioavailability of folates 232

**Folic acid**

foods, folic acid detn. in vitamin-containing 229

**Foodborne diseases**

pathogens, new generation of foodborne 33

**Frankfurters**

*Listeria monocytogenes* in vacuum-packaged frankfurters 169

low-fat meat frankfurters 168

properties of milk proteins/corn germ protein flour based frankfurters 167

**Freezing**

peas, freezing & sensory properties of 86

**Fried foods**

akara, consumer response to

cowpea paste 82

**Frozen foods**

dough, egg yolk/sugar ester & baking of frozen 146

temp. & *Listeria monocytogenes* growth in stored refrigerated foods 40

**Fruit juices**

filtration/centrifugation & enzymatic browning control in raw fruit juices 185

naranja A-1 detn. in fruit juices 184

**Fruits**

dietary fiber

nonenzymatic-gravimetric detn. in fruits 25

woolliness in stone fruits 111

**Functional properties**

soy protein isolates, heat treatment & functional properties of 94

wheat-chickpea flour blends, functional properties of 129

**GLC**

coriander seed oils, GLC analysis of 215

**Gari**

aflatoxin B<sub>1</sub> sodium

metabisulphite effect in gari 98

**Gas**

doughs, gas retention in non-heated 141

**Gas chromatography**

processed foods, cholesterol detn. GC in 236

**Genetics**

food industries & genetics 46

**Genotoxicity**

ester gums, genotoxicity of 52

**Germplasm**

*Amaranthus*, germplasm development of 103

grain *Amaranthus* germplasm screening in Thailand 106

**Ghee**

renovation of rancid ghee 161

**Glass**

grapefruit juices, browning pigments HPLC separation/spectrophotometric characterization from stored 187

**Globulins**

fababean globulins-acylated & pectin/protein interactions in o/w emulsions 83

**Glucan**

oat/oat bran,  $\beta$ -glucan enrichment in 56

**Glucoamylases**

*Aspergillus niger* mycelium & synthesis of glucoamylases 32

**Gluten**

wheat starch, Kjeldahl N values & gluten protein content for 70

**Glutenins**

wheat, kernel wt. & baking performance of 68

**Glutens**

corn, quality gluten of propionate-treated high-moisture milled 74

**Glycerol ester**

genotoxicity of glycerol ester 52

**Glycerol triacetate**

genotoxicity of glycerol triacetate 52

**Glycine max**

see Soybeans

**Glycols**

tapioca starch, polyethylene glycol/polyethylene glycol stearate & modifications of 99

**Goat milk**

cheese, microbial quality of goat milk based white-brined 158

**Grain Amaranthus**

100

Kenyan grain *Amaranthus* 102

Peru, grain *Amaranthus* research in 104

status of grain *Amaranthus* in 1990's 107

**Grains**

equipments for intake of high quality grains 13

**Grapefruit juices**

browning pigments HPLC separation/spectrophotometric characterization from stored grapefruit juices 187  
tartrazine quantitative analysis in grapefruit juices 188

**Grapes**

Monastrell grapes, wine volatile substances by fermentation of 179  
phenolic compounds & browning of grapes 113  
wines, carbonic maceration & aromatic compounds in Monastrell grape 115 116

**Groundnuts**

cyclopiazonic acid LC detn. in groundnuts 71

**Gums**

ester gums, genotoxicity of 52

**HPLC**

foods, nitrate level detn. HPLC in 19

- foods, thiamin detn. HPLC in 26
- grapefruit juices, browning pigments HPLC separation from stored 187
- soy proteins, SDS & HPLC of 95
- wheat, kernel wt. & baking performance RP-HPLC of 68
- Hazards**
  - foods, health risk & carcinogenic chemicals in 242
  - natural toxicants & public health 243
- Health**
  - foods, health hazard & carcinogenic chemicals in 241
  - foods, health risk & carcinogenic chemicals in 242
  - natural toxicants & public health 243
- Heat**
  - soy protein isolates, heat treatment & functional properties of 94
- Heater**
  - cooking, solar water pre-heater for 14
- Heating**
  - doughs, gas retention in non-heated 141
  - lufan/gari, aflatoxin B<sub>1</sub> heating effect in 98
  - microwave reheating, product design for 12
  - oil heating effect on rat organs 194
  - soy flour, characterization of dielectric heated 93
- Herbs**
  - nitrate level detn. in herbs 19
- Honeys**
  - aging in stored honeys 124
- Hops**
  - extraction-liquid CO<sub>2</sub>/ethanol & hop deterioration effect on extraction efficiency/extract quality 178
- Hydrocarbons**
  - carrot sticks, sesquiterpene hydrocarbons in processed stored 96
- Hydrogen peroxide**
  - lufan/gari, aflatoxin B<sub>1</sub> hydrogen peroxide effect in 98
- Hydrophobicity**
  - cereal/milk proteins, hydrophobicity detn. of 230
- Hypocholesterolemic effect**
  - oat bran, hypocholesterolemic effect of 57
- Industries**
  - flour milling industry, pollution control in roller 10
- Infrared spectroscopy**
  - sugar sol., analysis infrared spectroscopy of 27
- Instant foods**
  - Zn/Ca solubility in instant coffee/tea 191
  - Zn/Ca solubility in instant tea 191
- Iron**
  - baked products, acceptability/storage of Fe fortified 131
- Isotopes**
  - dietary minerals bioavailability to human 239
  - food web analysis, isotopes for 29
  - prehistoric diets & isotopes 238
- Juices**
  - nitrate level detn. in juices 19
- Kecap**
  - Asp. oryzae & Asp. flavus aflatoxin control during fermentation of kecap 43
- Kernel**
  - wheat, kernel wt. & baking performance of 68
- LLDPE**
  - milk packing, LLDPE film for 153
- Lactic acid**
  - poultry, lactic acid & Listeria monocytogenes in 170
- Lactic acid bacteria**
  - food industries & lactic acid bacteria 46
- Lactobacillus**
  - sourdough fermentor, Lactobacillus & performance of 132
- Lactobacillus plantarum**
  - cheese, L. plantarum in goat milk based 158
- Lactose**
  - dietary fibre effects of lactose 122
  - microbial activity & dietary fibre lactose 121
- Lauric acids**
  - oils, lauric acids & flavour of frying 198
- Lecithin**
  - egg noodles, lecithin-P<sub>2</sub>O<sub>5</sub> in industrially prepared 171
- Legume products**
  - air role in legume based products 1
- Leuconostoc oenos**
  - media & growth/yield/malolactic activity of L. oenos 37
- Limonene**
  - citrus by-products 114
- Lindanes**
  - tomatoes, water washing/detergents & lindane residues in 109
- Linoleic acids**
  - oils, linoleic acid in partially hydrogenated 199
- Linolenic acids**
  - oils, linolenic acids & flavour of frying 198
- Lipids**
  - Japanese soybean pastes & lipid peroxidation inhibition 92
  - breadmaking, lipid interactions in 140
  - oats, lipid changes water-induced during processing of 55
  - palm oil mill, process stream lipids in 211
  - volatiles from interactions of Maillard reactions/lipids 16
  - wheat flour, lipids & alveograph characteristics of 192
- Lipoproteins**
  - coffee consumption & serum lipoproteins 183
- Lipoxygenases**
  - soybeans, lipoxygenase in 90
- Liquid chromatography**
  - corn/groundnuts, cyclopiazonic acid LC detn. in 71
- Liquid smoke**
  - perches, liquid smoke & spoilage Aeromonas inhibition in 34
- Listeria monocytogenes**
  - food samples, L. monocytogenes detection, polymerase chain reaction assays in 38
  - foods, L. monocytogenes detection methods evaluation in 39
  - meat products, L. monocytogenes in 169
  - pork, meat curing ingredients & L. monocytogenes thermal destruction in ground 166
  - poultry, modified atm. packaging & L. monocytogenes in 170
  - salmon, L. monocytogenes growth in vacuum-packed/smoked stored 173
  - temp. & L. monocytogenes growth in stored refrigerated foods 40
- Lithium chloride**
  - wheat flour, lithium chloride & extraction of 54
- Longevity**
  - energy intake/dietary fat &



- problem of longevity 228
- Lufan**  
 aflatoxin B<sub>1</sub> sodium  
 metabisulphite/hydrogen  
 peroxide/heating effect in lufan  
 98
- Maceration**  
 wines, carbonic maceration &  
 aromatic compounds in Monastrell  
 grape 115 116
- Magnesium**  
 analysis method for Mg 235
- Maillard reactions**  
 volatiles from interactions of  
 Maillard reactions/lipids 16
- Malolactic activity**  
*Leuconostoc oenos*, media &  
 malolactic activity of 37
- Maple syrups**  
 flavour compounds & sensory  
 properties of maple syrups 219
- Margarines**  
 hedonic preference &  
 spreadability of margarines 195
- Marjoram**  
 extraction-high pressure of  
 marjoram 217  
 oleoresin, sensory properties of  
 marjoram 217
- Market**  
 fat substitute foods, market  
 potential for 197
- Maturation**  
 Cheddar cheese, ripening temp. &  
 maturation of 160
- Mayonnaise**  
 cholesterol detn. GC in  
 mayonnaise 236
- Meat**  
 processing industry-meat 165
- Meat products**  
 low-fat meat products 168
- Mecahnical properties**  
 wheat bran strips,  
 moisture-dependent changes in  
 isolated 67
- Metabolites**  
 fatty acid metabolism alteration  
 in plants 2
- Metals**  
 contamination, blenders &  
 clean-up procedure to reduce  
 trace metal 28
- Methacrylate**  
 starch, extrusion & methacrylate  
 polymerisation onto 127
- Methionine**  
 carbohydrates, batch fermentation  
 & methionine production from 240
- Methyl bromides**  
*Tribolium castaneum*, methyl  
 bromide & resistance in 226
- Methyl linoleate**  
 a<sub>w</sub> & secondary products  
 formation in autoxidizing methyl  
 linoleate 196
- Methylation**  
 processed foods, fatty acid  
 composition detn. methylation  
 method in 22
- Microbial quality**  
 cheese, microbial quality of goat  
 milk based white-brined 158
- Microorganisms**  
 biotechnology food products,  
 microbial aspects of 48  
 food safety-microbiological 31  
 lactose-dietary fibre & microbial  
 activity 121
- Microwaves**  
 foods, migration detn./sensory  
 evaluation of microwaved 4  
 product design for microwave  
 reheating 12
- Migration**  
 foods, migration detn./sensory  
 evaluation of microwaved 4
- Milk**  
 buffalo/cow's milk,  
 ultrafiltration behaviour of 150  
 LLDPE film for milk packing 153  
 paneer, buffalo/cow milk &  
 physico-chemical/sensory quality  
 of 163  
 UHT sterilization of milk 151
- Milk concentrates**  
 serum proteins chromatography of  
 fresh/stored buffalo milk  
 concentrates 152
- Mill**  
 palm oil mill centrifuge sludge,  
 enzyme treatment/surfactant &  
 residual oil recovery from 210  
 rice miller, evaluation of McGill  
 No. 2 58
- Milling**  
 corn, milling-dry of alkali  
 debranned yellow dent 76  
 corn, yield/composition of  
 propionate-treated high-moisture  
 milled 73  
 industry, pollution control in  
 roller flour milling 10  
 wheat, milling properties of  
 Karnal bunt infected 64
- Minerals**  
 dietary minerals bioavailability  
 to human 239
- Moisture**  
 wheat bran strips,  
 moisture-dependent changes in  
 isolated 67
- Moisture content**  
 starches/celluloses, moisture  
 content/water activity  
 sensitivity in 69
- Molds**  
 foods, molds enumeration method  
 in 42
- Naranja**  
 orange juices, naranja A-1  
 quantitative analysis in 189
- Nitrates**  
 foods, nitrate level detn. HPLC  
 in 19
- Noodles**  
 Japanese noodles, flour swelling  
 volume test evaluation & wheat  
 suitability for 62  
 cholesterol detn. GC in noodles  
 236  
 egg noodles, lecithin-P  
 20<sub>5</sub> in industrially  
 prepared 171
- Nutrients**  
 quinoa seeds,  
 nutrients/antinutrients/  
 /antinutrients in *Chenopodium*  
 quinoa@see Quinoa 18
- Nutrition**  
 alternative forms of nutrition 227  
 carotenoids/retinoids in human  
 nutrition 237  
 energy intake/dietary fat &  
 problem of nutrition 228  
 safety & nutrition 224
- Nutritional values**  
*amaranthus* cvs, processing &  
 nutritional quality of grain 101  
 bread, baker's yeast & nutritional  
 value of 139  
 cereal-pulse diet, nutritional  
 values of Bangladesh 81  
 faba beans, processing/cooking &  
 antinutritional factors of 84  
 oat/oat bran, nutritional values  
 in 56  
*Phaseolus vulgaris* (Nuna),  
 nutritive value of 85  
 tropical oils, nutritional values  
 of 206  
 wheat, nutritional values of  
 Karnal bunt infected 65
- Oat bran**  
 β-glucan enrichment in oat  
 bran 56  
 hypocholesterolemic effect of oat  
 bran 57
- Oat fiber**  
 lipid composition wet

- fractionation effect in oat fiber 55
- Oat proteins**
  - lipid composition wet fractionation effect in oat proteins 55
- Oat starch**
  - lipid composition wet fractionation effect in oat starch 55
- Oats**
  - $\beta$ -glucan enrichment in oat 56
  - bread, oat fiber & baking/storage stability of high fiber 137
  - lipid changes water-induced during processing of oats 55
- Oils**
  - AOCS method & ransoctadecenoate content in vegetable oils 204
  - fatty acids & flavour of frying oil 198
  - fatty acids & tocopherol stability in microwave heated vegetable oils 200
  - hydroxy fatty acids in oils 203
  - linoleic acid in partially hydrogenated oils 199
  - nutritional values of tropical oils 206
  - organs, oil heating effect on rat 194
- Oleic acids**
  - coriander seed oils, oleic acid in 215
  - oils, oleic acids & flavour of frying 198
- Orange juices**
  - colourants quantitative analysis in orange juices 189
- Oreochromis mossambicus**
  - crackers, *Oreochromis mossambicus* in fish 175
- Ovens**
  - bread, oxidants & oven rise/properties of Canadian short process 134
- Oxidants**
  - bread, oxidants & oven rise/properties of Canadian short process 134
- Oxidation**
  - foods, singlet oxygen oxidation of 15
  - methyl linoleate,  $a_w$  & secondary products formation in autoxidizing 196
  - soybeans, triacylglycerol composition/structures & oil oxidative stability in 213
- Oxygen**
  - singlet oxygen oxidation of foods 15
  - sweet taste potentiation & oxygen/sulphur 222
- Packaging**
  - apples, packaging & transport of 112
  - batching oils & sisal bags for packaging foods 6
  - confectionery, packaging of 123
  - milk, LLDPE film for packing 153
- Packaging materials**
  - $\gamma$ -radiation induced physical changes in Vietnam/Indian packaging materials 8
  - speciality paper for packaging 7
- Packaging modified atmosphere**
  - pasta modified atm. packaging 147
  - poultry, modified atm. packaging & *Listeria monocytogenes* in 170
- Palm oils**
  - fractionation procedures for cocoa butter-like fat from enzymatically interesterified palm olein 202
  - mill, process stream lipids in palm oil 211
  - nutritional values of palm oils 206
  - organic solvents & transmethylation of palm oils 208
  - quality evaluation of palm oils 209
  - sludge, enzyme treatment/surfactant & residual oil recovery from palm oil mill centrifuge 210
- Palmitic acids**
  - coriander seed oils, palmitic acid in 215
  - oils, palmitic acids & flavour of frying 198
- Paneer**
  - buffalo/cow milk & physico-chemical/sensory quality of paneer 163
  - technology 162
- Papain**
  - tray low-cost for papain collection 117
- Papayas**
  - glace, drying of papaya 118
  - puree, deoxygenation-enzymatic of aseptically packed stored papaya 119
- Paper**
  - packaging, speciality paper for 7
- Pasta**
  - microwavable pasta 147
  - retortable pasta 147
- Pathogens**
  - foodborne pathogens, fatty N-acyl amino acids antimicrobial activity against gram-positive 50
  - foodborne pathogens, new generation of 33
- Patties**
  - low-fat meat patties 168
- Pear juices**
  - filtration/centrifugation & enzymatic browning control in raw pear juices 185
- Peas**
  - freezing/storage & sensory properties of peas 86
  - tempeh fermentation, pea biochemical changes during 91
- Pectic substances**
  - carrots, pH & pectic substances of blanched 97
- Pectins**
  - citrus by-products 114
  - o/w emulsions, acylated fababeans globulins & pectin/protein interactions in 83
- Pejibaye palm**
  - Bactris gasipaes* starch, characterization of 128
- Perches**
  - Lates niloticus*, spoilage *Aeromonas* inhibition in 34
- Peroxidation**
  - lipid peroxidation inhibition & Japanese soybean pastes 92
- Pesticides**
  - control of pesticides 223
  - food safety & pesticide residue control 248
  - regulations & pesticide residues 246
- Petroselinic acids**
  - coriander seed oils, petroselinic acid in 215
- Phenolic compounds**
  - grapes/wines, phenolic compounds & browning of 113
  - rapeseeds, phenolic constituents in tropical 87
- Phosphates**
  - corn starch/soy protein blends, processing temp. & phosphate solubilized proteins in extrusion-cooked 80
  - foods, plant tissue electrode & phosphate detn. in 47
- Phosphines**
  - Tribolium castaneum*, phosphine & resistance in 226



- Phosphorus**  
analysis method for P 235
- Physical properties**  
cheese products, storage time & physical properties of 156
- Phytases**  
breadmaking, phytases & phytate degradation during 135
- Phytates**  
breadmaking, phytases & phytate degradation during 135
- Pigments**  
grapefruit juices, browning pigments HPLC  
separation/spectrophotometric characterization from stored 187
- Pineapple juices**  
composition of pineapple juices 190
- Plants**  
food processing plants 11
- Pollution**  
milling industry, pollution control in roller flour 10
- Polyester**  
sucrose fatty acid polyester as fat substitutes 193
- Polyethylene glycols**  
tapioca starch, polyethylene glycol/polyethylene glycol stearate & modifications of 99
- Polyphenol oxidases**  
grapes/wines, polyphenoloxidase & browning of 113
- Popping**  
Phaseolus vulgaris (Nuna), nutritive value of popping 85
- Pork**  
meat curing ingredients & Listeria monocytogenes thermal destruction in ground pork 166
- Potassium**  
analysis methods for K 235
- Potassium sorbate**  
perches, potassium sorbate & spoilage Aeromonas inhibition in 34
- Potato starch**  
amylose/amylopectin & pasting properties of potato starch 126
- Poultry**  
lactic acid/modified atm. packaging & Listeria monocytogenes in poultry 170  
processing industry-poultry 165
- Preservation**  
corn, propionate & preservation of high-moisture 75  
radioactivity & food preservation 3
- Processing**  
amaranthus cvs, processing & nutritional quality of 101  
faba beans, processing & antinutritional factors of 84  
food processing plants/machinery 11  
oats, lipid changes water-induced during processing of 55
- Propionates**  
corn, propionate & preservation of high-moisture 75  
corn, yield/composition of propionate-treated high-moisture milled 73
- Propionic acid**  
corn, propionic acid & Asp. flavus growth/aflatoxin production in 78
- Proteins**  
corn starch/soy protein blends, processing temp. & proteins in extrusion-cooked 80  
detn. of protein-bound SDS using ultracentrifugation 231  
food emulsions, protein concn. & stability of 20
- Proteins cereal**  
hydrophobicity detn. of cereal proteins 230  
wheat flour protein & loaf vol. of bread 142
- Proteins milk**  
frankfurters, properties of milk proteins/corn germ protein flour based 167  
hydrophobicity detn. of milk proteins 230  
serum proteins chromatography of fresh/stored buffalo milk concentrates 152
- Pulses**  
diet, nutritional values of Bangladesh cereal-pulse 81
- Quality**  
corn starch/gluten, quality of propionate-treated high-moisture milled 74  
palm oils, quality evaluation of 209
- Quinoa**  
Chenopodium quinoa seeds, nutrients/antinutrients in 18
- Radiation**  
packaging materials,  $\gamma$ -radiation induced physical changes in Vietnam/Indian 8
- $\gamma$ -Radiation  
packaging materials,  $\gamma$ -radiation induced physical changes in Vietnam Indian 8
- Radioactivity**  
food preservation & radioactivity 3
- Rajgeera**  
starch, cross-linked Amaranthus paniculatus 108
- Rancidity**  
ghee, renovation of rancid 161
- Ransoctadecenoate**  
oils, AOCS method & ransoctadecenoate content in vegetable 204
- Rapeseed oils**  
clay minerals & bleaching of alkali-refined rapeseed oils 205  
enzymatic interesterification & melting point of tallow-rapeseed oil mixtures 201  
rapeseed processing into oils 88
- Rapeseeds**  
phenolic constituents in tropical rapeseeds 87  
processing of rapeseeds 88
- Refining**  
sesame oils, refining alkali-enriched sodium metasilicate of 212
- Regulations**  
codex alimentarius process & food safety regulations 245  
pesticide residue regulations 246
- Rennets**  
casein, rennet curd & quality of 164
- Residues**  
foods, residue levels in 17  
pesticide residue regulations 246  
tomatoes, water washing & lindane residues in 109
- Retinoids**  
nutrition, retinoids in human 237
- Retort pouch**  
filling device for retort pouch 5
- Rheological properties**  
bread, emulsifiers & rheological properties of 138  
dough, rheological properties of durum/wheat flour 145  
wheat, rheological properties of Karnal bunt infected 64
- Rhizopus oligosporus**  
tempeh fermentation, R. oligosporus & soybean/pea biochemical changes during 91
- Rice**  
evaluation of McGill No. 2 rice miller 58

- Rice bran**  
dietary rice bran trypsin inhibitor effect on growth/pancreatic wt. of rats 60
- Rice products**  
ethanol for stabilized brown rice products 59
- Rice starch**  
amylose/amylopectin & pasting properties of rice starch 126
- Ripening**  
Cheddar cheese, ripening temp. & flavour development in buffalo 159  
Cheddar cheese, ripening temp. & proteolysis/maturation of 160
- Risk assessment**  
249
- Roasted foods**  
coffees, caffeine spectrophotometric UV detn. in green/roasted 182
- Saccharomyces cerevisiae**  
antigenicity of *Saccharomyces cerevisiae* 44
- Safety**  
biotechnological food products, safety of 48 49  
codex alimentarius process & food safety regulations 245  
dibenzyl ether, safety evaluation of 51  
food safety & pesticide residue control 248  
food safety risk assessment 249  
food safety, federal government role in 247  
foods, health hazard & carcinogenic chemicals in 241  
foods, safety & carcinogenic chemicals in 242  
microbiological food safety 31  
nutrition & safety 224
- Safflower oils**  
clay minerals & bleaching of alkali-refined safflower oils 205
- Salmon**  
*Listeria monocytogenes* growth in vacuum-packed/smoked stored salmon 173
- Sapota**  
*Achras sapota* leather, storage stability of 120
- Sausages**  
*Listeria monocytogenes* in fermented sausages 169  
cholesterol detn. GC in sausages 236  
low-fat meat sausages 168
- Sensory evaluation**  
analyzing time-intensity response in sensory evaluation 220  
cheese, sensory analysis of 154  
foods, migration detn./sensory evaluation of microwaved 4
- Sensory properties**  
bread products, sensory properties of 136  
frankfurters, sensory properties of milk proteins/corn germ protien flour based 167  
maple syrups, flavour compounds & sensory properties of 219  
marjoram oleoresin, sensory properties of 217  
palm oils, sensory properties of 209
- Sensory quality**  
paneer, buffalo/cow milk & sensory quality of 163
- Sepiolites**  
oils, sepiolites & bleaching alkali-refined vegetable 205
- Sesame oils**  
refining alkali-enriched sodium metasilicate of sesame oils 212
- Shelf-life**  
ghee, shelf-life extension in rancid 161
- Shigella flexneri**  
sodium nitrite & growth of *S. flexneri* 41
- Shrimps**  
SDS-PAGE identification of raw/cooked shrimps 172
- Sitosterols**  
coriander seed oils,  $\beta$ -sitosterols in 215
- Smoked foods**  
salmon, *Listeria monocytogenes* growth in vacuum-packed/smoked stored 173
- Soaking**  
oats, lipid changes water-induced during processing of 55
- Sodium**  
analysis method for Na 235
- Sodium chloride**  
*Aeromonas hydrophila*, NaCl & growth of 35  
corn, NaCl & *Asp. flavus* growth/aflatoxin production in 78  
perches, NaCl & spoilage *Aeromonas* inhibition in 34
- Sodium dodecyl sulphate**  
protein-bound SDS using ultracentrifugation, detn. of 231  
soy proteins, SDS & HPLC of 95
- Sodium metabisulphite**  
lufan/gari, aflatoxin B<sub>1</sub> sodium metabisulphite effect in 98
- Sodium metasilicate**  
sesame oils, refining alkali-enriched sodium metasilicate of 212
- Sodium nitrate**  
*Aeromonas hydrophila*, NaNO<sub>2</sub> & growth of 35
- Sodium nitrite**  
*Shigella flexneri*, sodium nitrite & growth of 41
- Solar energy**  
cooking, solar water pre-heater for 14
- Sorbitol**  
production, starchy substrates for sorbitol 125
- Soups**  
cholesterol detn. GC in dried soups 236
- Sourdough**  
fermentor, lactic acid bacteria/yeasts & performance of sourdough 132
- Soy flour**  
bakery products, soy flour use in 130  
characterization of dielectric heated soy flour 93
- Soy products**  
lipid peroxidation inhibition & Japanese soybean pastes 92  
tempeh fermentation, soybean biochemical changes during 91
- Soy proteins**  
SDS & HPLC of soy proteins 95  
blends, processing temp. & proteins in extrusion-cooked corn starch/soy protein 80  
body fat accumulation in albino rats & soy proteins 234  
drought/temp. & proteins of soybeans 89  
heat treatment & functional properties of soy protein isolates 94
- Soy sauces**  
*Asp. oryzae* & *Asp. flavus* aflatoxin control during fermentation of soy sauces 43
- Soybean oils**  
clay minerals & bleaching of alkali refined soybean oils 205  
drought/temp. & oil contents of soybeans 89  
sterol oxides in soybean oils 214
- Soybeans**  
bread, soybeans & baking/storage stability of high fiber 137



- oil composition in soybeans 90
- Spaghetti**
  - cooking loss colorimetric estimation for spaghetti 148
- Spectrophotometry**
  - coffees, caffeine spectrophotometric UV detn. in green/roasted 182
  - grapefruit juices, browning pigments spectrophotometric characterization from stored 187
- Spectroscopy**
  - sugar sol., analysis infrared spectroscopy of 27
- Spoilage**
  - perches, spoilage *Aeromonas* inhibition in 34
- Spreadability**
  - fats, hedonic preference & spreadability of 195
- Stability**
  - bread, storage stability of high fibre 137
  - food emulsions, protein concn. & stability of 20
  - frankfurters, bacterial stability of milk proteins/corn germ protein flour based 167
  - oils, fatty acids & tocopherol stability in microwave heated vegetable 200
  - soybeans, triacylglycerol composition/structures & oil oxidative stability in 213
- Starches**
  - Pejibaye palm starch, characterization of 128
  - extrusion & methacrylate/acrylamide/ acrylonitrile monomers polymerisation onto starch 127
  - moisture content/water activity NIR sensitivity in starches 69
  - sorbitol production, starchy substrates for 125
- Stearic acids**
  - oils, stearic acids & flavour of frying 198
- Steeping**
  - corn kernels, water distribution/mobility detn. NMR during steeping of 72
- Sterilization**
  - milk, UHT sterilization of 151
- Steroids**
  - soybean oils/wheat flour, sterol oxides in 214
  - soybeans, sterols in 90
- Storage**
  - baked products, storage of Fe/vitamin A enriched 131
  - bread, storage stability of high fiber 137
  - cheese products, storage time & physico-chemical properties of 156
  - grapefruit juices, browning pigments HPLC separation/spectrophotometric characterization from stored 187
  - honeys, aging in stored 124
  - refrigerated foods, temp. & *Listeria monocytogenes* growth in stored 40
- Storage fish**
  - salmon, *Listeria monocytogenes* in vacuum-packed smoked stored 173
- Storage fruits**
  - papaya fruits, deoxygenation-enzymatic of aseptically packed stored 119
  - sapota leather, storage stability of 120
- Storage vegetables**
  - carrot sticks, sesquiterpene hydrocarbons in processed stored 96
  - peas, storage & sensory properties of 86
- Sucrose**
  - fat substitutes in foods, sucrose fatty acid polyester as 193
- Sugar**
  - analysis infrared spectroscopy of sugar sol. 27
- Sulphur**
  - analysis method for S 235
- Sunflower oils**
  - clay minerals & bleaching of alkali-refined sunflower oils 205
- Sweet corn**
  - zeins in sweet corn 77
- Swelling**
  - noodles, flour swelling volume test evaluation & wheat suitability for Japanese 62
- Tapioca starch**
  - polyethylene glycol/polyethylene glycol stearate & modification of tapioca starch 99
- Tartrazines**
  - grapefruit juices, tartrazine quantitative analysis in 188
  - orange juices, tartrazines quantitative analysis in 189
- Tastes**
  - amino acids, time/intensity & taste of 221
  - oxygen/sulphur & sweet taste potentiation 222
- Tea**
  - instant tea, Zn/Ca solubility in 191
- Technology**
  - paneer technology 162
- Tempeh**
  - fermentation, soybean/pea biochemical changes during 91
- Texture**
  - peas, freezing/storage & flavour of 86
  - peas, freezing/storage & texture of 86
- Thermal processing**
  - pork, meat curing ingredients & *L. monocytogenes* thermal destruction in ground 166
- Thiamin**
  - foods, thiamin detn. AOAC/HPLC in 26
- Tocopherols**
  - oils, fatty acids & tocopherol stability in microwave heated vegetable 200
- Tomato juices**
  - pulper-finisher specifications & characteristics of tomato juices 110
- Tomatoes**
  - water washing/detergents & lindane residues in tomatoes 109
- Tortillas**
  - Ca bioavailability in lime treated tortillas 149
- Toxicity**
  - natural toxicants & public health 243
- Transmethylation**
  - palm oils, organic solvents & transmethylation of 208
- Transport**
  - apples, packaging & transport of 112
- Tray**
  - papain collection, tray low-cost for 117
- Tribolium castaneum***
  - phosphine/methyl bromide & resistance in *Tr. castaneum* 226
- Trypsin inhibitors**
  - dietary rice bran trypsin inhibitor effect on growth/pancreatic wt. of rats 60
- UHT milk**
  - milk, UHT sterilization of 151
- Ultrafiltration**
  - milk, ultrafiltration behaviour of buffalo/cow's 150
- Ultraviolet**
  - coffees, caffeine

spectrophotometric UV detn. in green/roasted 182

**Vacuum packaging**  
salmon, *Listeria monocytogenes* in vacuum-packed smoked stored 173

**Vegetables**  
dietary fibre  
nonenzymatic-gravimetric detn. in vegetables 25  
nitrate level detn. in vegetables 19

**Vitamin A**  
baked products, acceptability of vitamin A enriched 131

**Vitamins**  
foods, biotin/folic acid detn. in vitamin-containing 229

**Volatile compounds**  
lipids, volatiles from interactions of Maillard reactions/lipids 16  
wine volatile substances by fermentation of Monastrell 179

**Wastes**  
palm oil mill centrifuge sludge, enzyme treatment & residual oil recovery from 210

**Water**  
corn kernels, water distribution/mobility detn. NMR during steeping of 72

**Water activity**  
media, water activity changes in selected solid culture 30  
methyl linoleate,  $a_w$  & secondary products formation in autoxidizing 196  
starches/celluloses, moisture content/water activity NIR sensitivity in 69

**Wheat**  
baking quality of wheat 63  
durum wheat, contamination detection rapid tyrosinase test for 61  
fiber content of air-classified white flour from hard/soft wheats 66  
kernel wt. & baking performance of wheat 68  
nutritional/biological value of Karnal bunt infected wheat 65  
properties of Karnal bunt infected wheat 64

**Wheat bran**  
bread, wheat bran & baking/storage stability of high fiber 137  
strips, moisture-dependent changes in isolated wheat bran 67

**Wheat flour**  
bread, wheat flour protein & loaf vol. of 142  
chickpea-wheat flour blends, functional/baking properties of 129  
dough, additives & rheology of whole wheat flour 143  
dough, rheological properties of durum/wheat flour 145  
fiber content of air-classified white flour from hard/soft wheats 66  
flour swelling volume test evaluation & wheat suitability for Japanese noodles 62  
lipids/emulsifiers & alveograph characteristics of wheat flour 192  
lithium chloride & extraction of

wheat flour 54  
sterol oxides in wheat flour 214

**Wheat starch**  
Kjeldahl N values & gluten protein content for wheat starch 70

**Wheatgerm oils**  
clay minerals & bleaching of alkali-refined wheatgerm oils 205

**Wines**  
*Saccharomyces cerevisiae* & aroma of wines 179  
carbonic maceration & aromatic compounds in Monastrell grape wines 115 116  
filtration deep-bed in wines 180 181  
nitrate level detn. in wines 19  
phenolic compounds & browning of wines 113

**Yeast baker's**  
breadmaking, baker's yeast in 139

**Yeast brewer's**  
*Saccharomyces cerevisiae*, antigenicity of flocculating 44  
disc-diffusion test & differentiation of brewer's yeast 177

**Yeasts**  
*Saccharomyces cerevisiae* & aroma of wines 179  
foods, yeasts enumeration method in 42  
sourdough fermentor, yeasts & performance of 132

**Zeins**  
sweet corn, zeins in 77

**Zinc**  
tea/coffee, Zn solubility in instant 191



## GENERAL

250

Karel (M). **Advances in sciences and engineering - a challenge to food technology.** *Food Australia* 43(10); 1991: 459-463

Scientific developments and their impact on food technology (computer developments, biotechnology, material science of foods), engineered foods, developments in food processing and preservation, packaging advances and challenges for the future are the aspects covered in this article. SRA

251

Lehrer (SB) and O'Neil (CE). **Occupational reactions in the food industry.** *Food Technology* 46(5); 1992: 153-156

Food industry employees are exposed to a wide variety of substances (green coffee beans, flour and shellfish which are protein allergens and non-food agents such as honeybees, grain storage mites, antibiotics, thermophilic actinomycetes and rubber boots) which can induce allergic reactions and lead to various occupational diseases such as occupational asthma, hypersensitivity pneumonitis and dermatitis. Agents associated with occupational reactions, diagnosis, treatment of occupational asthma and coffee bean hypersensitivity are the various aspects discussed in this article. CSA

## FOOD PROCESSING

252

Rodriguez (AC), Smerage (GH), Teixeira (AA), Lindsay (JA) and Busta (FF). **Population model of bacterial spores for validation of dynamic thermal processes.** *Journal of Food Process Engineering* 15(1); 1992: 1-30

Data are presented supporting a new model of spore populations during isothermal and dynamic lethal heat treatments. The model incorporates activation, injury, and preliminary inactivation of less-resistant fractions as well as the usual predominant inactivation. Rate constants of those transformations were determined exp. for *Bacillus subtilis* strain A and were found to vary with temp. according to Arrhenius equations. Model generated and exp. isothermal survivor curves compared well. Comparison of model and exp. survivor curves for this species in a time-varying temp. regime showed the model to be a potentially good predictor of survivors during dynamic lethal heat treatment.

The new model could be particularly important in simulating sterilization and pasteurization processes, especially short duration UHT treatments, and microbiological validation of arbitrary, dynamic thermal processes. AA

253

Mertens (B) and Knorr (D). **Developments of nonthermal processes for food preservation.** *Food Technology* 46(5); 1992: 124, 126-133

Some key developmental activities concerning the process developments that deal with the design and application of nonthermal food preservation processes which include the utilization of electric or magnetic fields, microwave radiation, ionizing radiation, light pulses, high isobaric pressure, chemical agents such as CO<sub>2</sub> and polycationic polymers and lytic enzymes are summarized. CSA

## FOOD PACKAGING

254

Sharada Prasad. **Closure systems for processed food and beverage cans.** *Packaging India* 24(6); 1992: 31

Covers the advantages of using an Al can with different types of easy-to-open-ends (pour aperture type used for packing of liquids and full aperture type used for packing of solids and powders) for packaging of processed foods and beverages. CSA

255

Yoshii (J). **Recent trends in food packaging development in consideration of environment.** *Packaging Japan* 13(67); 1992: 74-80

Recent trends in food packaging, the future of food packaging, properties of packaging materials, environment friendly package (enviropet), PET recycling, silica coated film and chemical barrier such as CMB' OXBAR system are the aspects covered in this article. CSA

256

Vinoy Purushottam, Mahadeviah (M), Gowramma (RV) and Nareesh (R). **Packaging of some fruit and vegetable products in glass containers.** *Journal of Food Science and Technology (India)* 29(6); 1992: 368-370

Suitability of indigenously available glass containers has been studied for packing mango juice, banana puree, tomato puree and processed peas. Reduction in  $\beta$ -carotene was found to be less in amber coloured



bottles compared to colourless bottles. Corrosive products like banana and tomato puree could be safely packed in glass bottles. Acidification of brine was found essential for packing processed peas in glass bottles. AA

## **Packaging materials**

### **Aluminium**

257

Sankaran (R). **Progress in food processing through aluminium packaging.** *Packaging India* 24(6); 1992; 5, 7

Briefly covers progress made by the Indian food processing industries in the use of Al in food packaging and the advantages associated with it. CSA

258

Bhelande (HU). **Food and foil - status and prospects.** *Packaging India* 24(6); 1992; 15-18

The advantages of Al foil and its use in the industry for wrapping biscuits, chocolates, pouches for snack foods, ground spices, coffee etc, superwrap, tetra pak, retortable pouches for processed foods, foil trays, retortable trays and aluseal are discussed in this article. CSA

259

Lahiri (A). **Aluminium rigid container for processed food.** *Packaging India* 24(6); 1992; 19, 21-23, 25-27, 29

Aspects covered in this article include an overview of the packing industry in India; the suitability of Al for storing various food products (fish, meat, fruits, fruit juices, jam/jelly, butter/cheese, margarine, coffee/tea, pickles); the methods for production of Al containers (impact extruded containers, drawn cans (two piece), three piece cans); behaviour of Al with various substances including food products; theory of corrosion, factors affecting corrosion, corrosion and Al, galvanic corrosion and types of corrosion (pitting corrosion, intergranular corrosion, exfoliation corrosion, stress corrosion). CSA

## **FOOD ENGINEERING AND EQUIPMENT**

260

Driscoll (RH) and Intong (CL). **Modelling of recirculation for through-drying of granular products.** *Food Australia* 43(10); 1991; 456-458

An in-bin drying model for granular food products modified to incorporate recirculation of exit air is used to compare dryer operating efficiency at varying amounts of recirculation. A simple prediction allows dryer operation to be optimised by measurement of a saturation parameter for the exit air. For a particular product, the optimum recirculation rate can be predicted from measurement of the exit air conditions, suggesting a direct method of computer-control for the dryer. Use of high air speed, energy analysis of a deep-bed dryer, initial simulation results, development of simple model are described. SRA

261

Goedeken (DL), Tong (CH) and Lentz (RR). **Design and calibration of a continuous temperature measurement system in a microwave cavity by infrared imaging.** *Journal of Food Processing Preservation* 15(5); 1991; 331-337

262

Karwe (MV) and Tong (CH). **Effect of filling material on the temperature distribution in a thermal conductivity probe and thermal conductivity measurements: A numerical study.** *Journal of Food Processing Preservation* 15(5); 1991; 339-357

A numerical investigation taking into account the composite nature of a line thermal conductivity probe was carried out using a finite-difference technique, to study the temp. distribution inside a thermal conductivity probe for different filling materials. Air, mercury and a high thermal conductivity paste were used as the filling materials. The radial temp. gradient in a mercury filled probe was small, while a large temp. gradient was found in an air filled probe. It was found that the location of the thermocouple in the probe has very little or no effect on the calculated thermal conductivity values, for all 3 filling materials tested. The plots of temp. rise versus natural logarithm of time were piece wise linear. Correct thermal conductivity could be obtained only when an appropriate time interval was selected for calculation of slope. The time interval depended upon the type of filling material and the thermal capacity of the sample. AA

263

Xiong (X), Narasimhan (G) and Okos (MR). **Effect of composition and pore structure on binding energy and effective diffusivity of moisture in porous food.** *Journal of Food Engineering* 15(3); 1991; 187-208

Food samples of different compositions were formulated by extruding mixtures of starch and gluten of different compositions, whereas samples of



varying pore structure were obtained through extrusion of durum semolina at 57 and 137°C. Experimental measurements of desorption isotherm of these samples at different temp. in the range 25 - 40°C indicated that the water binding ability was fairly insensitive to the pore structure of food samples and was found to be lower for extruded and pregelatinized samples as well as for samples of higher gluten content. Experimental desorption isotherm data were represented by the Oswin equation in order to evaluate moisture binding energy as a function of moisture content and temp. by employing the Clausius-Clapeyron equation. Binding energy was found to be negligible at high moistures (above 0.2 d.b.), increasing at lower moisture contents, lower temp. and higher starch contents. Effective diffusivity of moisture through different moisture contents and temp. was inferred from drying curves in the temp. range 60 - 105°C. Effective diffusivity ( $D_{eff}$ ) was higher in pregelatinized samples and was found to be much higher through porous puffed pasta than regular pasta. The effect of composition on  $D_{eff}$  was confounded by the effect of pore structure as a result of variations in pore size distribution in the extruded samples of different compositions. The decrease in  $D_{eff}$  at lower moisture contents was postulated to be due to the decrease in the available free water for diffusion and was explained through a simple model which related the available free moisture to the binding energy. AA

264

Sumer (A) and Esin (A). **Effect of can arrangement on temperature distribution in still retort sterilization.** *Journal of Food Engineering* 15(4): 1992; 245-259

A general dynamic mathematical model was developed to predict the effect of can arrangement geometry on temp. distribution within cans in still retorts. For this purpose, the temp. variation in the cans was recorded for various can arrangements. Also, the influence of the physical properties of the material and the mechanism of heat transfer for heat penetration were studied. Exp. were carried out with water, peas in brine and tomato paste in no. 3 cans in an exp. vertical still retort. The equations employed for modelling were elliptic partial differential equations. They were solved numerically on a microcomputer using the finite element method. AA

265

Rahman (MS). **Thermal conductivity of four food materials as a single function of porosity and water content.** *Journal of Food Engineering* 15(4): 1992; 261-268

A thermal conductivity prediction regression equation was developed for 4 food materials as a single function of moisture content, porosity and initial thermal conductivity. It was assumed that temp. has a negligible effect on thermal conductivity. Thermal conductivity values of beef, apple, potato, pear and squid were used to develop the regression equation considering 122 points from the literature. The regression coeff. was 0.992. Squid gave the max. mean % deviation of 11.89 (standard deviation 14.39). Potato gave min. mean % deviation of 4.10 (standard deviation 1.74). AA

266

Campbell (S) and Ramaswamy (HS). **Distribution of heat transfer rate and lethality in a single basket water cascade retort.** *Journal of Food Process Engineering* 15(1): 1992; 31-48

Temp. and heat distribution studies were carried out in a single basket horizontal water cascading retort at 2 temp. and 2 air over-pressure levels under fully loaded operating conditions. Various heat transfer parameters (heating and cooling rate indices,  $f_h$  and  $f_c$ ), lag factors ( $j_{ch}$  and  $j_{cc}$ ) and process lethality ( $F_0$ ) were used as indicators of the retort performance. Time-temp. data gathered from 24 Lexan<sup>TM</sup> transducers were used for calculation of the heating and cooling rate indices as well as lethality. There were significant variations in the temp. distribution and heat transfer parameters at the different tray levels; however, these variations did not contribute to large variations in the accumulated overall process lethality. AA

267

Peleg (M). **On the use of the WLF model in polymers and foods.** *CRC Critical Reviews in Food Science and Nutrition* 32(1): 1992; 59-66

The validity of the WLF model with fixed "universal" coeff. was tested against that of the model original form with variable coeff. using published coeff. of polymers and amorphous sugars crystallization and viscosity data. The disagreement between the 2 versions of the model is particularly large at temp. ranges starting about 20 to 30°K above the glass transition or reference temp., excluding the former from being a model of general applicability. Because the WLF model mathematical structure entails the existence of an almost linear region near the reference temp., establishment of its validity as a kinetic model and meaningful detn. of its constants requires data spread over an extended temp. range, especially when the experimental results have a scatter. AA



Kirby (C). **Microencapsulation and controlled delivery of food ingredients.** *Food Science and Technology Today* 5(2); 1991: 74-78

This feature article discusses about microcapsule, role of microencapsulation and areas of application. BV

Hossain (MM), Cleland (DJ) and Cleland (AC). **Prediction of freezing and thawing times for foods of regular multi-dimensional shape by using an analytically derived geometric factor.** *International Journal of Refrigeration* 15(4); 1992: 227-234

Simple and better analytical formulae based on Biot number and parameters describing object shape (a number of regular two- and three dimensional objects) were found to predict freezing and thawing times of foods accurately as demonstrated by comparisons with large sets of experimental food freezing and thawing data. SD

Hossain (MM), Cleland (DJ) and Cleland (AC). **Prediction of freezing and thawing times for foods of two-dimensional irregular shape by using a semi-analytical geometric factor.** *International Journal of Refrigeration* 15(4); 1992: 235-240

Better semi-analytical formulae, based on Biot number and geometric parameters - characteristic dimension, vol. and surface area of products of irregular shape were found to predict accurately the freezing and thawing times as validated by experimental data. SD

Hossain (MM), Cleland (DJ) and Cleland (AC). **Prediction of freezing and thawing times for foods of three-dimensional irregular shape by using a semi-analytical geometric factor.** *International Journal of Refrigeration* 15(4); 1992: 241-246

By use of a model ellipsoid defined as having the same vol., characteristic dimension and smallest orthogonal cross-sectional area as the actual shape in conjunction with the proposed shape factor, published experimental freezing and thawing times of products were more accurately predicted than by other shape factor. SD

#### Equipments

Malcata (FX). **Modelling of a series of continuously stirred tank reactors for thermal processing of liquid foods.** *International Journal of Food Science and Technology* 26(5); 1991: 535-546

A series of stirred tanks for the thermal treatment of liquid foods is easy to model and operate. Good modelling leads to accurate predictions and small uncertainties in the lethality, giving a safe food product because of a small chance of underprocessing. Mathematical proof is presented that the min. overall reactor vol. for a given degree of thermal destruction of cells or spores is obtained when the stirred tanks are of equal size. Analytical techniques based on theoretical residence time distribution are employed to find the optimum number of tanks in the series using capital and operation costs in the definition of the objective function. If typical scaling factors are used, these optima depend only on the degree of reduction of viable cells/spores sought and a dimensionless economic parameter relating operating and capital costs if a single stirred tank were employed. AA

Barres (C), Vergnes (B) and Tayeb (J). **An improved thermal model for the solid conveying section of a twin-screw extrusion cooker.** *Journal of Food Engineering* 15(3); 1991: 167-185

A new analysis of mass and heat transfer in the partially filled conveying section of a twin-screw cooker extruder is presented. An original hypothesis, suggested by observations made during dead-stop exp., was introduced into the thermal model. A layer of material is assumed to be located in the clearance between the barrel and the tip of the screw flight. This layer is heated by conduction from the temp.-controlled barrel, and releases some energy to the solid powdery material transported in the screw channel. In parallel, the screws are assumed to be the origin of a large fraction of the heat supplied to the product. Complete temp. profiles along the solid conveying section were computed. The influence of different process parameters was evaluated. The results prove to be qualitatively satisfactory and in agreement with measurements. The limits of this model come from the fact that more complex phenomena (including friction between granules) have to be taken into account as soon as the screw channel is completely filled. AA

#### ENERGY IN FOOD PROCESSING

Nil



274

Stevenson (MH). **Detection of irradiated food.** *Food Science and Technology Today* 5(2): 1991; 69-73

The author discusses the techniques such as electron spin resonance spectroscopy, formation of volatile compounds from lipids including long chain hydrocarbons and 2-alkylcyclobutanones, and thermoluminescence used for detection of irradiated foods and to quantify the irradiation dose absorbed by food. BV

## Chemistry

275

Mavelle (T), Bouchikhi (B) and Debry (G). **The occurrence of volatile N-nitrosamines in French foodstuffs.** *Food Chemistry* 42(3): 1991; 321-338

N-nitrosodimethylamine was found in 89% of 258 food samples and 53 beverages in Eastern France in 1987-88 with a max. level of 16 µg/kg, the highest being found in fruit spirits, and lower in beer. Appreciable amounts of N-nitrosamine were found in nitrite-cured meats, smoked meats and fishes while the other N-nitrosamines being rare and usually below 0.5 µg/kg. SD

276

de Cindio (B), Grasso (G) and Cacace (D). **Water-in-oil-in-water double emulsions for food applications: Yield analysis and rheological properties.** *Food Hydrocolloids* 4(5): 1991; 339-353

Water-in-oil-in-water (W/O/W) emulsions are systems in which a water-in-oil (W/O) emulsion is dispersed in a second aqueous phase. The W/O emulsion exists in the suspending aqueous medium as oil globules containing smaller water droplets. In this work the techniques of preparation and yield analysis of W/O/W emulsions are described; microstructure and rheological behaviour are also studied with a view to possible food applications. In order to prepare W/O/W emulsions, a 2-step emulsification technique was used. During the first step, a W/O emulsion was prepared in the presence of a lipophilic emulsifier while, during the second step, the W/O emulsion was mixed with an aqueous sol. of a hydrophilic emulsifier to provide the W/O/W system. The yield of W/O/W emulsion was evaluated by measuring the amount of an ionic marker (NaCl) which migrated from the dispersed globules to the continuous aqueous phase, using dialysis to separate the NaCl migrated from the aqueous medium and using ionic chromatography

to detect the amount of the NaCl outcome. The microstructure was investigated by making phase-contrast microscope photographs and estimating the size distribution of the oil globules. Finally, the rheological behaviour of W/O/W systems was studied by means of both steady-shear and oscillatory measurements. AA

277

Ohashi (S), Ura (F), Takeuchi (M), Iida (H), Sakae (K), Ochi (T), Ukai (S), Hramatsu (K). **Interaction of thaumatin with carrageenans. II. Effects of pH, temperature and competing cations studied by circular dichroism.** *Food Hydrocolloids* 4(5): 1991; 379-394

Interaction of thaumatin with carrageenans was studied spectroscopically on the basis of circular dichroism (CD) at pH 3 - 7 and 20 - 60°C and examined from estimating the sweetness of the complex. The results obtained are summarized as follows: (i) The max. reaction ratios of thaumatin to carrageenan correlated with pH. (ii) At reaction temp. of 20 and 40°C there were different modes of structural change in thaumatin due to its binding to carrageenan between pH 3 - 4 and pH 5 - 7, accompanying a remarkable reduction of sweetness intensity of thaumatin at pH 3 - 4 and a lesser reduction at pH 5 - 7. (iii) At a reaction temp. of 60°C, the CD spectra at pH 3 and pH 7 seem to reflect at least the interaction of a structurally changed thaumatin and carrageenan in a random coil form. The most noticeable reduction in sweetness intensity of thaumatin was at pH 3 - 4 and less sweetness reduction occurred at pH 5 - 7. (iv) At a reaction temp. of 40 C, Ca<sup>2+</sup> or K<sup>+</sup> ranked first among Ca<sup>2+</sup>, Na<sup>+</sup> and K<sup>+</sup> in inhibitory action on the interaction of thaumatin with carrageenan and inability to dissociate the thaumatin-carrageenan complex. These cations inhibited completely at pH 5 - 7 but partially at pH 3 - 4. Also, thaumatin was completely dissociated from a thaumatin-carrageenan complex at pH 5 - 7 when a salt was added to the complex formation at pH 5 - 7 is due to electrostatic bonding (ionic bonds), but that at pH 3 - 4 another bonding mechanism is also involved. AA

278

Kirby (CJ), Whittle (CJ), Rigby (N) Coxon (DT) and Law (BA). **Stabilization of ascorbic acid by microencapsulation in liposomes.** *International Journal of Food Science and Technology* 26(5): 1991; 437-449

Ascorbic acid was encapsulated with high efficiency inside liposomes. In this form, its stability was enhanced compared to that in free aqueous sol., and particularly in the presence of a number of factors



widespread in foods, which normally lead to its rapid degradation. Possible mechanisms for these stabilizing effects are discussed. Amongst other potential applications, these findings are relevant to the preservation of nutritional supplements of vitamin C in sol. and to the development of naturally derived antioxidant systems for food protection. AA

279

Chakraborty (MK) and Patel (KV). **Chemical composition of Isabgol (*Plantago ovata* Forsk) seed.** *Journal of Food Science and Technology (India)* 29(6); 1992; 389-390

Dehusked isabgol seed had low oil content with a lipid profile high in free fatty acids, sterols and hydrocarbons making the oil a non-edible type. The defatted meal had high proportion of protein with high albumin, high lysine, medium methionine and digestible protein comparable to red gram *dhal*. AA

#### Chemistry (Analytical)

280

Mahesh (DL), Deosthale (YG) and Narasinga Rao (BS). **A sensitive kinetic assay for the determination of iodine in foodstuffs.** *Food Chemistry* 43(1); 1992; 51-56

A spectrophotometric kinetic assay for the detn. of iodine in foodstuffs is detailed. Iodine added to foods in the range 94 - 102% showed a recovery mean of 97 plus or minus 3.3%. The standardised method with detection limit of 0.4 ng and a sensitivity of 40 pg can also be adopted to determine iodine in serum, urine and other biological materials. SD

281

Russell (LF) and Vanderslice (JT). **Comments on the standard fluorometric determination of riboflavin in foods and biological tissues.** *Food Chemistry* 43(1); 1992; 79-82

The AOAC standard fluorometric procedure is shown not universally suitable for samples containing active enzyme systems or high concn. of fat. So a modification to permit the use of flow injection analysis is reported. SD

282

Oles (PJ) and Graham (WM). **Microwave acid digestion of various food matrixes for nutrient determination by atomic absorption spectrophotometry.** *Journal of the Association of Official Analytical Chemists* 74(5); 1991; 812-814

Microwave digestion is a rapid and readily automated approach for the preparation of a variety of food matrixes for nutrient detn. by flame AAS. Acceptable recoveries of spikes are obtained, and results are equivalent to hot plate digestions. Perchloric acid can be eliminated in the digestion, which offers additional advantages. BV

283

Tan (S), Tatsuno (T) and Okada (T). **Gas chromatographic/mass spectrometric determination of  $\alpha$ -methylstyrene in styrene-based polymers and food simulants.** *Journal of the Association of Official Analytical Chemists* 74(5); 1991; 815-818

A selected ion monitoring method is described for the analysis of styrene (St)-based polymers for  $\alpha$ -methylstyrene ( $\alpha$ -MSt) and for determining the level of  $\alpha$ -MSt migration from St-based sheets into 4 food simulants. The polymers are dissolved in dichloromethane;  $\alpha$ -MSt is determined by direct injection of the polymer sol.  $\alpha$ -MSt migration from St-based sheet to water, 4% acetic acid, 20% ethanol, and n-heptane was measured by GC/MS, using multiple ion monitoring of ions at  $m/z$  118, 78 and 91.  $\alpha$ -MSt can be quantitated at levels as low as 10  $\mu\text{g/g}$  in the polymer and 0.01  $\mu\text{g/g}$  in the food simulants. Recoveries were 83-113% from St-based sheets and 90-99% from food simulants, respectively. AA

284

Graham (DM), Filer (LJ) and Bigelow (SW). **A new approach for assessing the dietary exposure to food additives.** *CRC Critical Reviews in Food Science and Nutrition* 32(2); 1992; 157-160

Dietary Exposure Assessment Method (DEAM) proposed in this article can greatly improve the accuracy of food additive intake estimates. This method is also useful in reassessment of the risks associated with food chemicals. Other potential uses include estimating exposure to environmental chemicals (e.g., Pb), nutrient intake data (e.g., under consumption of starches, over consumption of fats, or the nutritional impact of macronutrient substitutes and pesticide residues (e.g., ethylene bisdithiocarbamates) in the food supply. 14 references. BV

285

So (RS), Madamba (LSP), Deseo (MA) and Migo (VP). **Determination of moisture in some food and agricultural materials using gas chromatography.** *ASEAN Food Journal* 6(4); 1991; 145-150



The use of a GC method for route analysis of moisture in a wide range of sample (rice bran, rice hull, bagasse, sweet potato peel, rice straw, copra meal and molasses) is described. This method involves extraction of water with an appropriate solvent (methanol) prior to GC analysis. The results showed that the detection response to water was linear upto 2.5%. The sensitivity of the method was 0.731 and the min. detectable limit was 0.25% water in the extract. Mean standard deviation of 10 replicates using the GC method was plus or minus 0.23% and the mean coeff. of variation (% cv) was 2.32%. An accuracy study showed an av. recovery of 98%. SRA

## FOOD MICROBIOLOGY AND HYGIENE

### Fermented foods

#### Tempeh

286

Ashenafi (M) and Busse (M). **Microbial development during tempeh fermentation from various beans and effect of *Lactobacillus plantarum* on the natural microflora.** *International Journal of Food Science and Technology* 26(5): 1991; 501-506

The microbial development during the fermentation of *tempeh* made of unacidified and acidified horsebean, pea, chickpea and soybean was studied. Increase in microbial count was observed during the fermentation of the various beans. *Bacillus* spp. and coryneform bacteria dominated the microflora and unacidified, and streptococci of acidified horsebean *tempeh*. In pea *tempeh*, lactobacilli dominated, in chickpea, micrococci, staphylococci and coryneform bacteria and in soybean *tempeh*, enterococci were the dominant genera. Inoculation of the cooked beans with *Lactobacillus plantarum* resulted in a lower pH and lower total counts in the various products. The use of *L. plantarum* in *tempeh* production may control the proliferation of undesirable microorganisms. AA

#### Microorganisms

287

Elliott (PH), Evancho (GM) and Zink (DL). **Microbiological evaluation of low-acid aseptic fillers.** *Food Technology* 46(5): 1992; 116, 118-122

Aspects discussed in this article are the microbiological methods used to establish critical factors for low-acid aseptic fillers, validating sterilization processes, challenging container

sterilization, calculating log cycle reduction, confirming equipment sterilization, determining spore resistance, demonstrating sterile air and standardizing the methods. CSA

### Fungi

#### *Penicillium aurantiogriseum*

288

Surekha (M) and Reddy (SM). **Efficacy of food preservatives in the control of penitrem-B production by *Penicillium aurantiogriseum*.** *Journal of Food Science and Technology (India)* 29(6): 1992; 397-398

Different food preservatives were screened for their efficacy in the control of penitrem-B production by *P. aurantiogriseum*. Acetone, sodium metabisulphate and propionic acid were found to be effective in the control of penitrem-B production by *B. aurantiogriseum*. Rest of food preservatives were ineffective in checking the production of penitrem-B. AA

### Yeasts

289

Kronlof (J) and Haikara (A). **Contamination of immobilized yeast bioreactors.** *Journal of the Institute of Brewing* 97(5): 1991; 375-380

Microbiological contamination of immobilized yeast bioreactors for lagering of beer was studied. 4 common brewery contaminants and 2 contaminants isolated from the continuous processing system were tested for their ability to survive and grow in the packed bed DEAE-cellulose bioreactors. Bacterial contaminants were washed out within less than 6 wks without causing any alterations in the flavour composition of the beer. The initial contamination levels were  $10^4 - 10^6$  cells  $ml^{-1}$ . Gram positive lactic acid bacteria, *Lactobacillus brevis* and *Pediococcus damnosus*, were more persistent than a Gram negative wort bacterium, *Enterobacter agglomerans*. The wild yeasts *Saccharomyces cerevisiae* (ex. *diastaticus*) and *Candida krusei* were the most persistent contaminants and the only ones able to grow in the reactors. Another wild yeast, *Rhodotorula rubra*, did not survive in competition with brewer's yeast and was washed out within a few wks. *C. krusei* and *R. rubra* were previously isolated from a spontaneously contaminated system. None of the contaminants caused formation of phenolic or other off-flavour compounds in detectable levels. AA

## BIOTECHNOLOGY

290

Hess (CE). **Biotechnology - derived foods from animals.** *CRC Critical Reviews in Food Science and Nutrition* 32(2); 1992: 147-150

291

Medley (TL). **Status of regulatory approval of biotechnology - derived plants and animals.** *CRC Critical Reviews in Food Science and Nutrition* 32(1); 1992: 151-155

292

Stanely (DW). **Biological membrane deterioration and associated quality losses in food tissues.** *CRC Critical Reviews in Food Science and Nutrition* 30(5); 1991: 487-553

This review covers: the biological membranes (properties), the role of membranes in living tissue, membrane deterioration (measurement and mechanism, food tissues, controlling membrane deterioration) summary, conclusions and recommendations. 218 references. SRA

## TISSUE CULTURE

Nil

## FOOD ADDITIVES

293

Ahmed (M) and Dickinson (E). **Foaming of aqueous solutions of protein + propylene glycol alginate.** *Food Hydrocolloids* 4(5); 1991: 395-402

Volumes of foams produced by sparging have been determined as a function of pH for dilute aqueous sol. containing a mixture of propylene glycol alginate (PGA) and a food protein ( $\beta$ -casein,  $\beta$ -lactoglobulin, gelatin or soy protein) in the ratio 10:1 by wt. At a concn. insufficient to give significant foaming on its own, each protein gives an enhancement in the foaming capacity of PGA at pH 7. The order of effectiveness of the proteins is:  $\beta$ -casein >  $\beta$ -lactoglobulin > gelatin > soy protein. The results are consistent with the formation of a weak electrostatic complex between protein and polysaccharide at the air-water interface under neutral pH conditions. AA

294

Hinton (DM). **Testing guidelines for evaluation of the immunotoxic potential of direct food additives.** *CRC Critical Reviews in Food Science and Nutrition* 32(2); 1992: 173-190

Immunotoxicity testing is a new addition to the safety assessment guidelines for direct food and colour additives. The approaches and philosophy for this area of specialized testing are consistent with the case-by-case strategy applied in the regulatory approval process, which is based on structure-activity relationships, preexisting knowledge, and projected exposure estimates. Specialized testing such as immunotoxicity is not part of the basic testing requirements, but would be applied when indicators are positive. Concepts for immunotoxicity testing have evolved, in part, from research for evaluating various testing methods as well as specific study designs. This research conducted over the last decade has focussed mainly on the rate as the rodent sp. of choice. The miniature swine was evaluated as a nonrodent model. Testing is defined by type 1 and type 2 tests, which differ in that type 1 tests are performed on the same animals used in the core study design. Sets of type 1 and type 2 tests, with reference to the indicators, define various testing levels. Retrospective testing, expansion of basic testing (such as histopathology and serum chemistry profiles), and alternative study designs, which include satellite groups for evaluation of the functional capacity of the immune system, can be considered in the evaluation of immunotoxic potential. 89 references. AA

295

Lin (CS). **Evaluating the safety of food and colour additives with pharmacokinetic data.** *CRC Critical Reviews in Food Science and Nutrition* 32(2); 1992: 191-195

Reviews the current scientific knowledge on properly designed pharmacokinetic studies applied in evaluation of the safety of food and colour additives and the limitations of such practical applications. Aspects covered include, use of pharmacokinetic data in safety evaluation (application of pharmacokinetic data in the design of toxicity studies, contribution of pharmacokinetic data in dose selection, use of pharmacokinetic data to aid in the interpretation of results obtained from toxicity studies, and use of pharmacokinetic data to improve the risk assessment process. 24 references. SRA

296

Schiffmann (D) and Schlatter (J). **Genotoxicity and cell transformation studies with sorbates in Syrian hamster embryo fibroblasts.** *Food and Chemical Toxicology* 30(8); 1992: 669-672



Sorbic acid, sodium sorbate and potassium sorbate were tested for their genotoxic potential in the Syrian hamster embryo (SHE) fibroblast micronucleus assay and the SHE cell transformation test *in vitro*. Sorbic acid and potassium sorbate showed no activity in either test system. When freshly prepared sodium sorbate sol. were used, no genotoxic or cell-transforming activity was detected. However, sodium sorbate as stored sol., which previously had been heated and sonicated to facilitate solubilization, yielded a positive response in both test systems. It is concluded that oxidation products of sodium sorbate that possess genotoxic and cell-transforming properties are formed under conditions of heating, sonication and storage. AA

## Antioxidants

297

Shahidi (F), Janitha (PK) and Wanasundara (PD). **Phenolic antioxidants.** *CRC Critical Reviews in Food Science and Nutrition* 32(1): 1992: 67-103

Phenolic antioxidants of both synthetic and natural origin, their mode of action and the active components of naturally occurring plant foods are discussed in this review. Aspects covered include: autoxidation-general considerations, mechanism of lipid autoxidation, prevention of autoxidation and use of antioxidants, estimation of antioxidant activity, types of antioxidants (mechanism of action of phenolic antioxidants, synthetic food phenolic antioxidants, BHA and BHT, TBHQ, propyl gallate (PG), nordihydroguaiaretic acid, degradation products of phenolic antioxidants and their antioxidant activity, degradation products of antioxidants mixtures and their antioxidant activity), natural antioxidants (tocopherols, mechanism of antioxidant activity of tocopherol, extraction of tocopherol from natural sources, phenolic acids and flavonoids, structure-activity relationships) natural sources of plant antioxidants (soybean, peanut and cottonseed, mustard and rapeseed, rice, sesame seed, canary seeds, tea, herbs and spices, rosemary and sage, oregano, mace, black pepper, turmeric), other sources of antioxidants (olive, onion, sweet potato, oats, guala gum, creosote bush, exudate/leaf wax, fungi wood smoke), toxicology of phenolic antioxidants used as food additives (tocopherol, BHA, BHT, TBHQ, PG, flavonoids) and future research needs. 110 references. SRA

## CEREALS

298

Sopade (PA), Ajisegiri (ES) and Badau (MH). **The use of Peleg's equation to model water absorption in some cereal grains during soaking.** *Journal of Food Engineering* 15(4): 1992: 269-283

Water absorption during soaking of maize, millet and sorghum at 10°C, 30°C and 50°C was studied using Peleg's equation. The equation gave a reasonable fit to experimental data. Peleg constants were obtained for the cereals. The constant  $K_2$  was unaffected by temp. of soaking. Temp. dependence of the reciprocal of the Peleg constant  $K_1$  was determined using an Arrhenius equation. Activation energy was in the range 13.99 - 16.23 MJmol<sup>-1</sup> compared to 19.02 - 19.56 MJ mol<sup>-1</sup> obtained for soybean, cowpea and undehulled groundnut. An exponential relationship was proposed to describe the relationship between the rate of absorbed water per unit change in temp. and the activation energy. AA

299

Knuckles (BE), Chiu (MM) and Betschart (AA).  **$\beta$ -Glucan-enriched fractions from laboratory-scale dry milling and sieving of barley and oats.** *Cereal Chemistry* 69(2): 1992: 198-202

Dry milling and sieving of barley and oats produced fractions that were enriched in  $\beta$ -glucan [(1-3), (1-4)- $\beta$ -D-glucan]. Hulled and hullless var. of barley and defatted rolled oats and oat bran, containing < 10% moisture, were ground and sieved with a 325-mesh screen (45- $\mu$ m openings). Coarse material retained by the screen was reground and resieved. The resulting coarse fraction, with a wt. yield of 18 - 30%, contained 16-27% total  $\beta$ -glucan. Further sieving of this  $\beta$ -glucan-rich fraction with a 100-mesh screen (147- $\mu$ m openings) yielded fractions representing 1.7 - 16.5% of the kernel wt. and containing up to 28% total  $\beta$ -glucan. The water-soluble  $\beta$ -glucan was about 55% of the total  $\beta$ -glucan for all test materials except Wanubet barley, in which soluble  $\beta$ -glucan ranged from 60 - 70% of the total  $\beta$ -glucan. Dry milling and sieving techniques can be used to prepare barley and oat fractions with  $\beta$ -glucan concn. 2.4 - 4.9 times those of the original grain. AA

300

Anon. **Demonstration of the 2-gram mixograph as a research tool.** *Cereal Chemistry* 69(2): 1992: 229

## Rice

301

Paramasivam (P), Perumal (R), Gopalaswamy (A) and Subramaniam (S). **Effect of amellorants on yield, uptake of nutrients and quality of rice under**



**sodic soils.** *Andhra Agricultural Journal* 37(4): 1990: 357-362

Inorganic amendment gypsum and organic amendments such as pressmud, groundnut shells, paddy husk and their combinations, when applied to rice grown in sodic soil, increased the rice protein content from 5.68 to 7.74%. GS

302

Varadaraj (MC), Keshava (N), Nirmala Devi, Dwarakanath (CT) and Manjrekar (SP). **Occurrence of *Bacillus cereus* and other *Bacillus* species in Indian snack and lunch foods and their ability to grow in a rice preparation.** *Journal of Food Science and Technology (India)* 29(6): 1992: 344-347

*Bacillus brevis*, *B. cereus*, *B. circulans*, *B. coagulans*, *B. laterosporus*, *B. licheniformis*, *B. pumilus*, *B. stearothermophilus* and *B. subtilis* were isolated from Indian snack and lunch foods. Higher count of  $4.2 \log_{10}$  (cfu/g) and a lower count of  $2.6 \log_{10}$  (cfu/g) were observed in *bisibele bhath* and *uppuma*, respectively. The isolated cultures were positive for production of either one or more of the following: hemolysins, phospholipase, protease, lipase and amylase. A few selected cultures of *Bacillus* sp. occurring as post-processing contaminants in plain cooked rice reached cell populations which were sufficient to cause health hazards. These findings indicate the significance of *Bacillus* sp. as post-processing contaminants in processed foods. AA

### Brown rice

303

Champange (ET) and Hron (RJSr). **Stabilizing brown rice to lipolytic hydrolysis by ethanol vapors.** *Cereal Chemistry* 69(2): 1992: 152-156

Brown rice can be stabilized to lipolytic hydrolysis by exposure to vapors from boiling aqueous ethanol (EtOH). During 6 months of storage at 36°C, free fatty acids increased little or none in brown rice kernels treated with EtOH vapors for 3 - 10 min. Flours produced from treated kernels had low residual lipase activity. Treated kernels and flours prepared from them were more susceptible to oxidative deterioration than untreated kernels and flours, as indicated by increases in conjugated diene hydroperoxide content during storage. EtOH vapor treatment lowered the moisture content of the 12.8%-moisture brown rice kernels approx. 1.5%; loss of kernel oil was < 3%. The water content of 8%-moisture kernels was not changed, and no oil was extracted by the EtOH vapor treatment. Thiamin and tocopherols were not lost in EtOH vapor-treated kernels. Thermal curves of treated

and untreated kernels obtained by differential scanning calorimetry indicated no starch gelatinization in the treated kernels. EtOH vapor treatment of brown rice kernels reduced microbial populations to very low levels. AA

### Wheat

304

Dong (H), Sears (RG), Cox (TS), Hosney (RC), Lookhart (GL), Shogren (MD). **Relationships between protein composition and mixograph and loaf characteristics in wheat.** *Cereal Chemistry* 69(2): 1992: 132-136

To study the relationships between protein composition and baking properties of 135 randomly selected wheat (*Triticum aestivum*) lines from a randomly mated population, gliadin proteins by acidic buffer polyacrylamide gel electrophoresis (PAGE) and high mol. wt. (HMW) glutenin proteins by PAGE in the presence of sodium dodecyl sulphate was analysed. The amount of protein in each gliadin band was estimated from densitometer scans, and presence or absence of particular glutenin subunits was recorded. Simple correlations were calculated among individual gliadin bands, Payne glutenin score, and each of 5 quality parameters: mixing time, mixing tolerance, water absorption, loaf vol., and crumb grain score. Five gliadin bands were correlated with loaf vol., 2 with crumb grain score, 12 each with mixing time and mixing tolerance, and 6 with water absorption. No correlations were detected between protein concn. and presence of any particular gliadin or glutenin proteins. Payne score was significantly correlated only with loaf vol. and mixing time. Significant correlations were found between protein concn. and both loaf vol. and absorption and between mixing tolerance and crumb grain score. No associations were found between total protein content and mixing properties. Multiple regression analyses were conducted for each of the functional tests, with the individual gliadin and/or HMW glutenin bands as independent variables. Prediction of 26 - 45% of the variation in quality parameters required 8 to 11 gliadin and glutenin bands. Glutenin subunits 5 + 10 had the most consistently positive effect on most of the quality measurements. These biochemical methods can be used to identify wheat genotypes with specific HMW glutenin and gliadin composition in parental and early-generation selections, but phenotypic quality traits must be considered as well. AA

305

Symons (SJ) and Dexter (JE). **Estimation of milling efficiency: Prediction of flour refinement by the measurement of pericarp fluorescence.** *Cereal Chemistry* 69(2): 1992: 137-141



Millstreams from pilot-scale milling of commercially grown wheat representing different crop years and several Canadian wheat classes were used to evaluate the measurement of flour refinement of fluorescence imaging of pericarp tissue. Flour fluorescence was measured using a No. 09 filter combination (excitation 450 - 490 nm, emission > 520 nm specific for pericarp). Pericarp fluorescence was able to discriminate between 4 groups of divide flours (first patent, second patent, straight grade and clears) prepared from No. 1 Canada Western Red Spring (CWRS) millstreams. However, the measurements were not fully sensitive to the small variations in flour refinement among the flours within each divide flour group. The relationships of fluorescence measurements to flour ash content, grade colour and the tristimulus brightness component ( $L^*$ ) for millings of Grain Research Lab. harvest survey No. 1 CWRS eastern and western prairie composites from 3 successive crop years and growing location. Comparisons of millstreams from composites of the No. 1 grade of Canada Western Red Winter, Canada Prairie Spring (red), and Canada Western Utility wheat classes showed highly significant relationships between pericarp fluorescence and flour ash, flour grade colour, and  $L^*$ . The relationships between pericarp fluorescence and the flour refinement indices for the different wheat classes were heterogenous, however, indicating that the prediction of ash content or flour colour established from millstreams obtained from one wheat class cannot be extrapolated to other wheat classes. AA

306

Huebner (FR) and Gaines (CS). **Relation between wheat kernel hardness, environment, and gliadin composition.** *Cereal Chemistry* 69(2); 1992: 148-151

Variation in wheat kernel hardness has recently increased, making wheat classification more difficult. To assess effects of growing conditions on protein composition and hardness, wheat grown in a greenhouse and commercial field-grown wheats were examined. Mature kernels from greenhouse plants were harvested and segregated according to origin from wheat heads. Individual kernels were tested for hardness with a particle size analyzer, and gliadins were extracted and analyzed by HPLC. Chromatograms were integrated, and amounts of fractions varying in hydrophobicity were determined. For greenhouse-grown wheats, hardness correlated with at least one gliadin fraction but not with original head positions of kernels. This also was true for commercial wheats, but such samples also varied in hardness due to multiple genotypes. Thus, differences in hardness among single kernels of the cv may result from variation in

protein synthesis in kernels from different head locations, from variation between heads of the same plant that develop at different dates, and from multiple biotypes within cvs. AA

307

Malouf (RB), Lin (WDA) and Hosney (RC). **Wheat hardness. II. Effect of starch granule protein on endosperm tensile strength.** *Cereal Chemistry* 69(2); 1992: 169-173

A hard and a soft wheat flour were fractionated into starch, gluten, and water solubles. These fractions were interchanged and reconstituted into doughs, which were dried and ground. Tablets made from these reconstituted flours had low tensile strength when the starch fraction was from the soft wheat, regardless of the source of the other 2 fractions. Tablets had intermediate tensile strength when made with soft wheat gluten and the hard wheat fraction. Proteins, including the 15-kDa sodium dodecyl sulphate-polyacrylamide gel electrophoresis band, were removed from the soft wheat starch fraction by using either proonase or sodium dodecyl sulphate. These treatments did not gelatinize the starch. The starch fraction from soft wheat with the surface protein removed-gave tablets with high tensile strength. These results support the hypothesis that the 15-kDa protein associated with soft wheat starch granules has a dominant influence on wheat endosperm texture. Pronase treatment removed essentially all protein from the starch fractions, suggesting that nearly all proteins associated with starch granules are on the surface. AA

308

Van Lonkhuijsen (HJ), Hamer (RJ) and Schreuder (C). **Influence of specific gliadins on the breadmaking quality of wheat.** *Cereal Chemistry* 69(2); 1992: 174-177

Thirty-two wheat samples with the same high mol. wt. (HMW) glutenin-A subunit composition but different gliadin compositions varied greatly in breadmaking quality. Loaf vol. ranged from 4.450 to 6.160 ml/kg of flour. Variation in the relative composition of 4 gliadin peaks, as identified and quantified by reversed phase HPLC, explained 82% of this variation. Multiple linear regression coeff. corresponding to 3 of these peaks (4, 10 and 33) were negative. Lactate polyacrylamide gel electrophoresis (lactate-PAGE) analysis revealed that these peaks contain gliadins migrating in the  $\omega$ -gliadin region. The coeff. of peak 70, which contains gliadins migrating on lactate-PAGE in the  $\gamma$ -gliadin region, was positive. These results show that gliadins, as well as HMW glutenins, can



strongly influence breadmaking properties of wheat.  
AA

309

White (NDG), Jayas (DS), Mills (JT) and Dronzek (BL). **Effects of canola oil or white mineral oil at dust suppressant levels on the storage characteristics of wheat.** *Cereal Chemistry* 69(2); 1992; 182-187

The storability of wheat, treated with canola oil or white mineral oil at levels used for dust suppression, was studied in the lab. Oils were applied at 100, 200, 400, 600 and 1,000 p.p.m., and treated and untreated wheat samples were stored for up to one yr at 2.5, 10, 20, 30 and 40°C. Moisture content of wheat was unaffected by all oil concn. but was lower at the higher temp. Dry grain did not produce moldy or rancid odours after one yr, but wheat at 15 - 18.6% moisture content and 2.5°C produced odour regardless of oil treatment. Fat acidity values (FAV) for the wheat were unaffected by mineral oil after one yr, but canola oil initially caused an increase of 6-7% in FAV, from values of 14.5 mg of KOH per 100 g of dry seed, for every 100 p.p.m. of oil. Although germination tended to be lower at higher oil treatment levels, differences generally were not significant. Microfloral associations with seeds were not clearly affected by any oil treatment. The reproduction of 5 female and 5 male *Tribolium castaneum* or *Cryptolestes ferrugineus* was unaffected by canola oil at 100 - 1,000 p.p.m. in 8 wks. Mineral oil had no effect on *T. castaneum*, but it decreased *C. ferrugineus* offspring by 50% at 1,000 p.p.m. Degradation of the insecticides malathion or chlorpyrifos-methyl on wheat with 200 or 600 p.p.m. of mineral oil, stored at varying ambient temp. (30 to -20°C) or 20°C, was largely unaffected by the oils after one yr. AA

310

Wu (VY) and Stringfellow (AC). **Air classification of flours from wheats with varying hardness: Protein shifts.** *Cereal Chemistry* 69(2); 1992; 188-191

Air classification of wheat flour (6 hard red winter [HRW], 4 hard red spring [HRS], and 4 soft wheats [SW]) produced an ultrafine fraction with a protein content of 38-54% (N x 5.7, dry basis) in 0.3 - 1.5% yield and a fine fraction (< 15 µm) with protein content of 21 - 30% in 11 - 25% yield. Brule, a HRW wheat with both hard and semihard kernels, produced a < 15-µm fraction with the highest protein content (30%) and yield (16%) of all HRW wheats studied. The ultrafine and < 15-µm fractions may have commercial potential as a protein concentrate. HRS wheat, HRW wheat, and SW classes differed in protein content of the 24- to 30-µm fraction, protein

shift, and ratio of protein content of the < 15-µm or 24- to 30-µm fractions to protein content of the flour.  
AA

311

Billaderis (CG), Izydorczyk (MS), Lukow (OM) and Bushuk (W). **Pentosans in flours of 1B/1R translocation wheats.** *Cereal Chemistry* 69(2); 1992; 226-228

### Wheat flour

312

Gupta (RB), Batey (IL) and MacRitchie (F). **Relationships between protein composition and functional properties of wheat flours.** *Cereal Chemistry* 69(2); 1992; 125-131

Relationships between protein composition (measured by size-exclusion HPLC of sonicated flour suspensions in sodium dodecyl sulphate-buffer sol.) and various flour quality parameters were investigated for a set of 15 hexaploid wheat cvs grown at 6 different N fertilizer levels. As the flour protein content increased the proportion of glutenin (peak 1) remained constant, the proportion of gliadin (peak 2) increased, and the proportion of albumin-globulin (peak 3) decreased. Only the glutenin measurements (i.e., the percentage of glutenin in the protein, PG, and the % of glutenin in flour, FG) showed consistent relationships with different quality parameters. Flour quality parameters depended in different ways on these two measurements. Extensigraph extensibility, farinograph dough development time, and loaf vol. in a long fermentation baking test correlated better with FG than with PG, accounting for 68 - 80% of the variation in these parameters. These correlations were higher than those with flour protein, indicating that the long-established relationships between these quality parameters and flour protein may reflect more fundamental relationships with flour glutenin. Other quality parameters (extensigraph resistance, mixograph dough development time, loaf volume in a rapid baking test) correlated better with the PG and thus appeared to depend on the balance between polymeric and monomeric proteins. However, less of the variation (38 - 56%) could be ascribed to PG. Evidence was obtained that an additional contribution to the variation in the latter parameters originated in the glutenin subunit composition, in particular, in the balance between the high and low mol. wt. subunits. AA

313

Shelke (K), Hoskeney (RC), Faubion (JM) and Curran (SP). **Age-related changes in the cake-baking**



**quality of flour milled from freshly harvested soft wheat.** *Cereal Chemistry* 69(2): 1992: 141-144

The milling and cake-baking quality of freshly harvested soft red winter wheat composites from 2 crop yrs over 16-wk period after harvest was monitored. In both yrs, composites of 3 var. were milled biweekly, and a portion of the flour was chlorinated immediately after milling. The quality of white layer cakes produced from the untreated and chlorinated flours was assessed over a 2-wk period following each milling. Flour particle size analyses indicated that the kernels did not become harder with time after harvest. Regardless of chlorination, freshly milled flours produced batters with high sp. gr. Batter sp. gr. decreased greatly during the first 2 days after milling and continued to fall thereafter at a lower rate. Immediately after milling, all flours (regardless of chlorine treatment) produced collapsed cakes. The cake-baking quality of the flours improved with both wheat and flour age. Flour milled from freshly harvested soft wheat changed rapidly in the time immediately after milling. The rate of postmilling changes slowed as a function of prior wheat storage time. Chlorine treatment improved cake-baking quality and dampened but did not prevent the observed postmilling fluctuations in quality. AA

314

Shelke (K), Hoseney (RC), Faubion (JM) and Curran (SP). **Age-related changes in the properties of batters made from flour milled from freshly harvested soft wheat.** *Cereal Chemistry* 69(2): 1992: 145-147

A consistent pattern of age-related changes in the properties of wheat and flour over 2 consecutive crop yrs was noted. The on set temp. of starch gelatinization in wheat endosperm increased slightly as a function of postharvest time. Freshly milled flours had low distilled water binding capacity (DWBC) and produced batters of low viscosity at ambient temp. and during heating. DWBC of flours, both untreated and chlorinated, was lowest immediately after milling, increased during the first wk, and changed little after that. The time required to reach the max. DWBC value decreased as wheat age increased. Batter viscosity at ambient temp. and min. viscosity during heating both increased as a function of flour age. DWBC was strongly correlated with cake-baking quality of flours milled from freshly harvested wheats. AA

315

Malouf (RB) and Hoseney (RC). **Wheat hardness. I. A method to measure endosperm tensile strength using tablets made from wheat flour.** *Cereal Chemistry* 69(2): 1992: 164-168

To obtain a direct measure of tensile strength of reconstituted endosperm from common wheat (*Triticum aestivum* L.), tablets were made by compressing flour that contained 28% moisture. Those tablets were then dried under controlled RH. Dried tablets were fractured in diametral compression to measure tensile strength. As expected, tablets made from hard wheat flour had greater tensile strength than those made from soft wheat flour. In tablets made from hard or soft wheat flours, contact between starch granules and the surrounding protein phase was visually similar to that of typical hard or soft wheat endosperms. A hard and a soft wheat flour were fractionated into starch, gluten and water solubles. These fractions were reconstituted into doughs, which were dried and ground. Tablets made from these reconstituted flours had tensile strength similar to that of tablets made from the parent flours. Factors influencing tablet tensile strength remained active through the processes of storage, milling, fractionation, reconstitution, and tablet making. AA

## MILLETS

### Corn

316

Snehalatha Reddy (N), Kamble (RM) and Khan (TNI). **Evaluation of nutritional quality of maize and maize products.** *Indian Journal of Nutrition and Dietetics* 28(3): 1991: 90-94

Nutritional evaluation for maize (*Zea mays*), (i) Maize roti, (ii) popped maize and (iii) maize flakes is reported. Total P, crude protein, non-protein nitrogen, total Fe, ionisable Fe were determined. Crude protein was more in maize kernels (9.43 g %) than in roti (8.76 g %) popped maize (7.76 g %) and flakes (6.90 g %). Non-protein nitrogen (g %) was 0.234 in (i), 0.34 in (ii) and 0.3 in (iii) and 0.194 in kernels. Total P content in was 242 mg in (i), 207 mg in (ii), 205 mg in (iii) and 0.251 in maize kernels. Total Fe content in (i), (ii) and (iii) was 2, 1.90 and 1.93 mg % respectively and it was 2.13% in kernels. The ionisable Fe content (mg%) was 0.133 in (i), 0.187 in (ii), 0.153 in (iii) and 0.12 in kernels. Bioavailability of Fe was max. in popped maize and min. in maize kernels and it showed significant negative correlation with phytate P, tannin and acid detergent fibre. Digestibility of maize proteins was significantly lower than that from their products. A negative correlation was observed between the protein digestibility and phytate P, tannin and acid detergent fibre. GS



317

Esuoso (KO), Oderinde (RA) and Okogun (JI). **Citric acid production from inumu *Cyperus esculentus* and maize *Zea mays***. *Journal of Fermentation Technology (Hakko Kogaku Zasshi)* 71(3): 1991: 200-202

The production of citric acid from inumu and maize was carried out using *Aspergillus niger*. Hydrolysis of the substrates at 97°C produced a higher concn. of reducing sugars than at 40°C. The concn. of citric acid were higher in unagitated and defatted cultures compared to agitated and undefatted cultures respectively. AA

318

Beaver (RW), James (MA) and Lin (TY). **Comparison of and ELISA-based screening test with liquid chromatography for the determination of aflatoxins in corn**. *Journal of the Association of Official Analytical Chemists* 74(5): 1991: 827-829

An enzyme-linked immunosorbent assay (ELISA) screening test (CITE PROBE) was compared to liquid chromatography (LC) for the detn. of aflatoxins in naturally contaminated corn samples. The CITE PROBE, with a positive/negative cutoff of 5 ng/g aflatoxin B<sub>1</sub>, was correct (based on LC results) on 47 of 51 samples. Two of the incorrect responses by the CITE PROBE were false positives on samples containing 4.1 ng/g aflatoxins by LC. Another incorrect response was a false negative on a sample containing 5.5 ng/g aflatoxins by LC. The fourth incorrect response was a false positive on a sample containing 1.9 ng/g aflatoxins by LC. On the basis of these results, the CITE PROBE was determined to be a reliable screening method for the detection of greater than or equal to 5 ng/g aflatoxins in corn. AA

319

Fox (SR), Johnson (LA), Hurburgh (CRJr), Dorsey-Redding (C) and Biale (TB). **Relations of grain proximate composition and physical properties to wet-milling characteristics of maize**. *Cereal Chemistry* 69(2): 1992: 191-197

The relations of proximate compositions and physical properties of 27 maize hybrids to lab.wet-milling characteristics were determined. No single trait accounted for more than 40% of the variation ( $r^2$ ) in starch yield or more than 60% of the variation in protein content of the recovered starch. Merely having higher starch content in the kernel did not increase starch yields ( $r = 0.20$ ). Hybrids with lower protein contents ( $r = -0.63$ ) and higher 1,000-grain wts ( $r = 0.43$ ) yielded more starch, whereas hybrids with higher protein contents ( $r = 0.77$ ) and harder endosperms ( $r = 0.58$ ) gave higher

residual protein contents of recovered starch. The best models for predicting starch yields included grain protein content and any one of the following: test wt., absolute density, kernel hardness (Stenvert sample height), or water absorptivity (index or initial rate). The preferred model for starch yield (percentage of starch yield =  $58.2 - 3.6$  [percentage grain protein] +  $0.5$  [test wt.]) accounted for 61% of the variation. Protein content in starch was a function of grain protein and oil contents. The preferred model for protein content of recovered starch (percentage of protein in starch =  $-1.28 + 0.23$  [percentage grain protein] +  $0.13$  [percentage grain oil]) accounted for 66% of the observed variation. AA

### Corn bran

320

Mistry (AH) and Eckhoff (SR). **Alkali debranning of corn to obtain corn bran**. *Cereal Chemistry* 69(2): 1992: 202-205

An alkali-debranning process was developed for yellow dent corn to obtain corn bran without disintegrating or splitting the kernel. NaOH was found to be the most effective alkali for loosening the pericarp of the kernel and subsequently separating it in a hydroabrasor, leaving the kernel absolutely free of pericarp. The pericarp obtained was dried and expressed as bran yield on a corn dry-solids basis. Three variables significantly affecting bran yield were alkali concn. from 4 to 10%, treatment time from 5 to 12 min, and treatment temp. from 46 to 68°C. A max. bran yield of 4.68% on dry-corn basis (standard deviation = 0.014%) occurred at 6% alkali concn, 9-min treatment time, and 57°C. Corn bran contained 92.1% dietary fiber, which constituted 95.5% of the total dietary fiber present in the pericarp. Corn drying temp. and endosperm hardness had no significant effect on the bran yield. The bran obtained by the alkali-debranning process was more purified than the commercial corn brans produced by wet-and dry-milling processes. AA

### Corn chips

321

Achoba (II), Elegbede (JA), Agbaji (AS) and Agbaji (EB). **Moisture isotherms of corn chips at three temperatures**. *International Journal of Food Science and Technology* 26(5): 1991: 547-552

The moisture sorption isotherms of corn chips at 3 ambient temp. (27, 35 and 40°C) were sigmoidal, a function of temp. and described by the Henderson equation. Storage stability of the product would be enhanced below 27°C and 3.4 moisture content dry basis (d.b.). The isosteric heats of sorption were calculated. AA



## Sorghum

### Sorghum flour

322

Rom (DL), Shull (JM), Chandrashekar (A) and Kirleis (AW). **Effects of cooking and treatment with sodium bisulphite on *in vitro* protein digestibility and microstructure of sorghum flour.** *Cereal Chemistry* 69(2); 1992: 178-181

The predominant indigestible proteins in cooked sorghum are kafirins, which are stored in protein bodies. *In vitro* pepsin digestion assay and scanning electron microscopy were used to examine the effects of cooking and treatment with sodium bisulphite on protein digestibility and protein body microstructure. *In vitro* pepsin digestion assay showed that sorghum decreases in protein digestibility after cooking. Treatment with sodium bisulphite increased the digestibilities of both cooked and uncooked flour. Scanning electron micrographs revealed that in all treatments the protein matrix is digested before the protein bodies. Protein bodies in uncooked samples were digested by pitting from the outer surface. In contrast, the protein bodies from the cooked sorghum did not exhibit any pitting. They became ellipsoidal. Cooking changed the protein bodies so that they could not be digested as they had before cooking. Protein bodies in cooked samples that had been soaked in sodium bisulphite did exhibit shallow pits, suggesting a reversal in the reactions that took place during cooking. Since sodium bisulphite prevents the formation of disulphide bonds during cooking and makes the sorghum more pepsin-digestible, formation of disulphide bonds is probably responsible for reduced protein digestibility in cooked sorghum. AA

## PULSES

323

Rajaram (N) and Janardhanan (K). **Studies on the underexploited tree pulses, *Acacia catechu* Willd., *Parkinsonia aculeata* L. and *Prosopis chilensis* (Molina) Stunz: Chemical composition and antinutritional factors.** *Food Chemistry* 42(3); 1991: 265-273

*Prosopis chilensis* contained higher crude protein and crude lipid than common pulses. All the 3 pulses were rich in K, Ca, Mg and Fe, being distinctly deficient in sulpho-amino acids, cystine and methionine. *P. aculeata* and *P. chilensis* having albumins and glutelins as the major seed protein.

the former was deficient in sulpho-amino acids, cystine and methionine and the latter in threonine and tryptophan + phenylalanine. Antinutritional factors - total free phenols, tannins, L-DOPA, haemagglutinating activity and trypsin inhibitor activity were reported. SD

### Chickpeas

324

Narpinder Singh, Sekhon (KS), Usha Bajwa and Shyama Gopal. **Cooking and parching characteristics of chickpea (*Cicer arietinum* L.).** *Journal of Food Science and Technology (India)* 29(6); 1992: 347-350

Five improved and a local var. of chickpea were evaluated for their physical, chemical, hydrating, cooking and parching characteristics. 'PBG-1' var. had the lowest seed wt., seed vol. and hydrating properties; but required the highest force for breaking and crushing. The var. 'PGB-1' and 'GL-769', after 60 min of cooking, indicated low cooked kernel yield, solid losses, lower overall acceptability and were rated poor for cooking. These var. had poor puffing properties, while the local var. was found to be the best for puffing purposes. AA

### Cowpeas

325

Bittenbender (HC). **Handling and storage of cowpea *Vigna unguiculata* (L.) Walp. as a leaf vegetable.** *Tropical Agriculture* 69(2); 1992: 197-199

Cowpea cv 'Vita 7' leaves packed in a closed 2 mil polythene bag and stored at 15°C for 6 days were edible. Irrespective of storage temp. and package ventilation, the edible leaves retained a moisture content similar to that of freshly harvested leaves. BV

326

Bakr (AA) and Gawish (RA). **Nutritional and cooking quality evaluation of dry cowpea (*Vigna sinensis* L.) grown under different agricultural conditions. 2. Effect of soaking and cooking processes on the physical, nutritional and sensory characteristics of cooked seeds.** *Journal of Food Science and Technology (India)* 29(6); 1992: 375-380

Cooking time, vol. and firmness of cooked cowpeas were not affected by foliar application of plants with gibberellic acid, cycocel and white wash under non-saline conditions. Salinization increased cooking time and decreased vol. and firmness of cooked seeds. Soaking in water for 12 h before

cooking, decreased cooking time and firmness, but increased vol. of cooked seeds, whereas the effect of soaking in hot water was more pronounced. Rate of water imbibition during cooking of dry and soaked seeds was linear to cooking time. Soaked seeds in distilled water gave the highest wt. at any time of cooking. More solids were leached out due to cooking in 2% NaCl sol. compared to cooking in plain water subsequent to hot water soaking for 12 h. Soaking in hot water before cooking retained more nutritional components. Soaking in hot water improved markedly the sensory properties particularly appearance, texture, colour and reduced the beany flavour. AA

#### **Mucuna pruriens**

327

Josephine (RM) and Janardhanan (K). **Studies on chemical composition and antinutritional factors in three germ plasm seed materials of the tribal pulse, *Mucuna pruriens* (L.) DC.** *Food Chemistry* 43(1); 1992; 13-18

Three germ plasm seed materials of the Indian tribal pulse collected from different agroclimatic regions contained albumin and globulin as the major bulk; higher crude protein and lipid; and rich in minerals (Mg and P). All the anti-nutritional factors except L-DOPA detected can be eliminated by cooking. Also the globulins showed weak agglutination with erythrocytes. The germ plasms from silent valley and Lucknow were rich in threonine and that from Begur in Fe. SD

#### **Mung beans**

##### **Mung bean starch**

328

Oates (CG). **Studies on mung bean starch: Granule stability.** *Food Hydrocolloids* 4(5); 1991; 365-377

Physicochemical measurements confirm that mung bean starch exhibits restricted swelling and high granular stability. The effect of a non-specific protease upon the fractionation and type of product obtained after hydrolysis with amylases was investigated. Successful fractionation was achievable only after treatment with the protease. Limited debranching and reduced  $\beta$ -amylase activity was shown; such phenomena are typical of cross-bonded starch. Further study using proteolytic enzymes suggests that the amylopectin fraction of mung bean starch is stabilized by the presence of peptide cross-links. Electrophoresis indicated the presence of 2 major polypeptides of low

mol. wt. associated with the amylopectin fraction. AA

#### **Pigeonpeas**

329

Singh (U), Santosa (BAS) and Rao (PV). **Effect of dehulling methods and physical characteristics of grains on *Dhal* yield of pigeonpea (*Cajanus cajan* L.) genotype.** *Journal of Food Science and Technology (India)* 29(6); 1992; 350-353

Two traditional methods of dehulling - manual and home-processing (stone *chakki*); and 2 lab. methods - barley pearler and tangential abrasive dehulling device (TADD)) - were employed to study the dehulling quality of 8 pigeonpea genotypes. *Dhal* yield by TADD was the highest (80.0%) for 'ICPL 87052' and the lowest (54.1%) for 'ICPL 87049' indicating significant ( $P < 0.01$ ) differences among genotypes. These results were further substantiated by the *dhal* yield values obtained by barley pearler. The stone *chakki* gave highly variable and erroneous results on *dhal* yield. The TADD and barley pearler methods were comparable and reliable. The theoretical *dhal* yield (manual method) was not correlated with *dhal* yields obtained by stone *chakki*, barley pearler and TADD. Grain hardness and grain vol. were negatively correlated with the *dhal* yields obtained by the TADD and barley pearler methods, whereas swelling capacity and grain flotation values were not correlated with *dhal* yields obtained by these methods. AA

#### **OILSEEDS AND NUTS**

##### **Canola**

330

Kermasha (S), Khalyfa (A), Alli (I) and Lee (B). **Purification and characterization of lipoxygenase isozymes from canola (*Brassica napus* cv, Westar) seed.** *Journal of Food Biochemistry* 15(3); 1991; 219-238

##### **Cottonseeds**

331

Kulkarni (AS), Khotpal (RR), Shingwekar (PB) and Bhakare (HA). **Glycolipid composition of some seed varieties of cotton.** *Journal of Food Science and Technology (India)* 29(6); 1992; 366-368

Glycolipids, from 6 var. of cottonseeds showed the prominence of diglucosyl and monoglucosyl diglycerides which accounted for 62 - 71% in



addition to the presence of steryl glucoside (SG), acylated steryl glucoside (ASG) and an unidentified component. The fatty acid composition of total and component glycolipids showed the presence of myristic, palmitic, oleic, stearic, linoleic acids as major acids. Glucose was identified as a sugar moiety. The ratio of sugar-sterol-fatty acid was nearly 1:1:1 in ASG and that of sugar-sterol was nearly 1:1 in SG. AA

## Sarson

332

Berry (SK) and Sehgal (RC). **Physical and chemical characteristics of Chinese Sarson (*Brassica chinensis*) seeds and oil.** *Journal of Food Science and Technology (India)* 29(6): 1992: 391-392

Comparison of physical and chemical characteristics of Chinese sarson (*Brassica chinensis*) seeds and oil with other mustard var. indicated that the Chinese sarson seeds are low in oil but high in protein content. Sp. gr. and saponification value of Chinese sarson oil are slightly higher compared to other Brassicaceae seed oils. Oil contains more erucic acid and less linolenic acid than other var. AA

## Sesame

333

Jagannatham (A), Srinivasa (P), Reddy (SG) and Soundararajan (MS). **Effect of foliar application of growth regulators and nutrients on Sesamum.** *Andhra Agricultural Journal* 37(4): 1990: 398-399

Sesamum (*Sesamum indicum*) plants were sprayed with 1% urea, 1% diammonium phosphate (DAP), 2.5 p.p.m. triacontanol, 50 p.p.m. naphthalene acetic acid, 0.5% ZnSO<sub>4</sub>, 5% FeSO<sub>4</sub>, 0.5% micronutrients separately and with their combinations. Foliar treatments were given at 500 l/ha and 800 l/ha at 25 and for 40 days after sowing respectively. Grain yield was higher with ZnSO<sub>4</sub> (718 Kg/ha) and with micronutrients (713 Kg/ha) than the control (635 Kg/ha). Oil content did not increase by any treatment and was not better than the control. KAR

## Sesame products

### Tehina

334

Lindner (P) and Kinsella (JE). **Study of the hydration process in tehina.** *Food Chemistry* 42(3): 1991: 301-319

The hydration transforms *tehina* (sesame butter) from a suspension of hydrophilic insoluble solids in anhydrous state to an oil-in-water emulsion (solids become dispersed when the water exceeds 30%), significantly increases viscosity upon addition of small amounts of water (< 12%) followed by oil-separation from the hydrated solids at 24 - 30% water content. The oil-water emulsion is stabilized by adsorption of swollen insoluble solids onto interfacial film around the oil droplets. Process did not alter solubility of meal protein, change the amino acid composition nor the electrophoretic pattern of subunits of the salt-soluble  $\alpha$ -globulin fraction whose mode of aggregation changed to form units of half the mol. wt. reported for sesame globulins. SD

## Soybeans

335

Sakai (N) and Yonekawa (S). **Three-dimensional image analysis of the shape of soybean seed.** *Journal of Food Engineering* 15(3): 1991: 221-234

An apparatus for 3-dimensional (3-D) measurement with a structured light system was made to study the shape of soybean seed: its axial length, surface area, vol., particle density, compactness and sphericity were measured. From the analysis on a reduced sample of the seed population, the typical size and shape of seed were calculated. The 3-D properties of surface area and vol. were expressed as functions of seed mass. In general, soybean seed appears to be uniform in shape over a wide range of sizes. AA

## Soy products

### Poshak

336

Neerja (A), Joshi (KC), Gandhi (AP) and Sinha (LK). **Studies on the preparation of poshak: a soybased supplementation food.** *Indian Journal of Nutrition and Dietetics* 28(3): 1991: 78-81

Bengal gram, roasted wheat and blanched soybeans were ground in a domestic Burr mill and mixed in the 4:2:1 ratio. This supplementation food called 'Poshak' was fried in fat. Sugar syrup with 1/3 consistency and powdered cardamom were added and laddu was prepared. It was observed *Poshak* is comparable to commercial supplementary foods like *Cerelac* and *Farex*. Fat content in *Poshak* is higher (7.8%) than *Farex* (7.5%); but protein content is higher in *Poshak* (19.0%). Blanching of soybean eliminates the antinutritional factors. *Poshak* is very cheap (Rs. 9.00 for 500 g) and can be prepared at homes with simple appliances. GS



## Snacks

337

Das (HK). **Crisp and spicy soybean snack.** *Journal of Food Science and Technology (India)* 29(6): 1992: 387-389

Use of soybeans as snack food of the type exemplified by roasted peanuts was explored by roasting hydrated beans, hull removal and splitting. The product had a crunchy texture, mild nutty flavour and was devoid of urease activity. Shelf-life of the unspiced product was 4 months in ordinary storage and one yr in air-tight containers. AA

## Soy milk

338

Rasyid (F) and Hansen (PMT). **Stabilization of soy milk fortified with calcium gluconate.** *Food Hydrocolloids* 4(5): 1991: 415-422

High-calcium soy milk was prepared by adding Ca gluconate as a Ca source, sodium hexametaphosphate (SHMP) as a sequestering agent, and calcium-D-saccharic acid as a stabilizing agent, so that the Ca content of soy milk was increased to the same or higher levels than that of bovine milk. It was demonstrated that the addition of these substances resulted in a soy milk with a high content of Ca and satisfactory heat stability of the final beverage. SHMP and calcium-D-saccharic acid were shown to be effective for reduction of the Ca ion activity of the soy milk. The findings suggest that there is a synergistic effect between the sequestering agent and the stabilizing agent. AA

## Soy proteins

339

Mouecoucou (J), Villaume (C), Bau (HM), Nicolas (JP), Mejean (L), Schwartz (A). **Effects of soybean protein diets supplemented with different levels of sodium alginate or carrageenan in rats.** *Food Hydrocolloids* 5(1/2): 1991: 45-47

Soybean meal diets with 0.5, 1, 2 and 3% alginate showed no effects on cholesterol levels in 21 day old male Wistar strain rats but the effect on triglyceride level required to be confirmed. Soybean meal with 0.5, 1, 2 and 3% carrageenan led to a very significant decrease in serum triglyceride level but had no effect on cholesterol levels. As the food intake were not significantly different the effects on growth and triglyceride levels could be due to insufficient intestinal absorption caused by diet viscosity. SD

340

Dahl (SR) and Villota (R). **Extrusion performance of N-propanol denatured soybean protein.** *Journal of Food Processing Preservation* 15(5): 1991: 315-330

Alcohol modified soybean flours, treated with various concn. of aqueous n-propanol and spray dried, were evaluated for texturization performance using a Werner Pfleiderer twin-screw extruder. Alcohol modification showed significant quality variation of texturized soy proteins. The high quality of extruded low solubility alcohol-modified soy flour at high feed rates may be due to renaturation mechanisms. The microstructural features of dried alcohol-modified products examined by SEM correspond to other extrudate properties. SD

## TUBERS AND VEGETABLES

### Potatoes

341

Gonzalez (JM), Lindamood (JB) and Desai (N). **Recovery of protein from potato plant waste effluents by complexation with carboxymethylcellulose.** *Food Hydrocolloids* 4(5): 1991: 355-363

The processing of potato products from fresh potatoes produces waste effluent containing substantial amounts of protein. In this study, the recovery of a protein-hydrocolloid complex from a simulated potato processing plant waste effluent (SPWE), using carboxymethylcellulose (CMC) as the complexing agent, was investigated. The effects of CMC to protein ratio (CPR), pH, temp. and type of CMC with respect to degree of substitution (DS) on complex formation and protein recovery were studied. Optimum results were obtained using CMC DS 0.85 - 0.95, CPR of 0.05, and pH 1.5 - 4.0. The temp. of precipitation had little effect in the range of 4 - 25°C. The recovered complex contained 76.6% protein, 17.6% CMC and formed a bulky precipitate easily separated from the SPWE. AA

### Vegetables

342

Prabhakar (E), Backyavathy (DM) and Nandakumar (NV). **Seasonal analysis of pesticide residues by HPLC in some vegetables of Tirupati.** *Andhra Agricultural Journal* 37(4): 1990: 390-392

Residues of BHC, DDT, fenitrothion, methyl parathion, and carbamate were determined by HPLC in 96 tomato (*Lycopersicon esculentum*) and Lady's



finger (*Hibiscus esculentus*) samples. 52% of the samples contained 0.036 to 6.900 p.p.m. of BHC and fenitrothion was 0.083 to 38.9 p.p.m. in both the vegetables. Methyl parathion, and carbaryl (carbamate) residues were relatively low. KAR

343

El Ghaouth (A), Arul (J), Ponnampalam (R) and Boulet (M). **Use of chitosan coating to reduce water loss and maintain quality of cucumber and bell pepper fruits.** *Journal of Food Processing Preservation* 15(5): 1991: 359-368

Cucumber and bell pepper coated with chitosan (1 and 1.5% w/v) stored at 13 and 20°C (RH 85%) reduced respiration rate, loss of colour, wilting and fungal infection and delayed senescence due to its ability to alleviate water stress. Increased concn. of chitosan (1.5% w/v), resulted in significantly greater wt. retention. SD

344

Kochar (G), Kumar (RS) and Singh (B). **Glucosinolate contents of commonly grown and consumed vegetables of Himachal Pradesh.** *Journal of Food Science and Technology (India)* 29(6): 1992: 396-397

On fresh matter basis, high glucosinolates were found in mustard seeds (3.1%) and mustard leaves (2.7%) followed by fenugreek leaves (1.9%). The values for cauliflower, turnip, cabbage and knol-khol were 1.7, 1.2, 0.7 and 0.6%, respectively. When expressed on dry matter basis, the glucosinolate contents were highest in mustard leaves (26.3%) followed by cauliflower (18.2%) but lowest in knol-khol (8.7%) and cabbage (8.3%). AA

#### Brinjals

345

Bhupal Reddy (T), Balasubramaniam (KA) and Suryanarayana (V). **Studies on fungicide residues in brinjal fruits.** *Andhra Agricultural Journal* 37(4): 1990: 393-395

Brinjal (*Solanum melongena*) plants were sprayed (4 sprayings) with Dithane in 1979-80 and 1980-81 separately. M-45 (0.25% concn.) and dithane Z-78 (0.5% concn.) with 10 days intervals between sprayings (4 sprayings); last spray was 20 days before harvest. Residue was highest, in the first yr at spray concn. of 0.5% with both the fungicides. At 0.25% concn. the residue was significantly low. In the 2nd yr recovery of Dithane M-45 residue was higher than in the 1st yr at 0.5% concn. At 0.25% level, the recovery was low. Degradation of fungicides was noticed only at 20 days after

spraying, during both the yr. Fruits with calyx retained more residue than those without calyx. GS

#### Broccoli

346

Logomarsino (JV) and Jin Gao. **Ascorbic acid retention of broccoli held on a refrigerated salad bar.** *Journal of Food Quality* 14(6): 1991: 513-519

Raw broccoli florets held at 13 plus or minus 2°C and 22 plus or minus 2°C locations from the cooling source of a commercial salad bar unit for 8 h, refrigerated for 16 h and returned to the unit for 2 h were analysed at 0, 2, 4, 8, 24 and 26 h for reduced ascorbic acid (RAA). RAA significantly decreased in 22°C, the values being 94.8 plus or minus 3.2% at 13°C and 88.9 plus or minus 7.1% at 22°C. There was no significant treatment differences in moisture content. SD

#### Leafy vegetables

##### Amaranthus

347

Ologunde (MO), Shepard (RL), Afolabi (OA) and Oke (OL). **Bioavailability of iron to rats from fortified grain amaranth flour.** *International Journal of Food Science and Technology* 26(5): 1991: 493-500

In this study, fortified and unfortified grain amaranth seed flour and FeSO<sub>4</sub> fortified casein diet as control were evaluated for their Fe bioavailability. NaFeEDTA ferrous fumarate, and FeSO<sub>4</sub>-fortified grain amaranth were fed to Sprague Dawley weanling male rats. Fe intake Hb Fe gain, Fe availability and binding capacity, serum Fe, non-haem liver Fe and relative biological value (RBV) were determined and values compared with FeSO<sub>4</sub>-fortified casein control; all were improved greatly by fortification. Relative biological values (RBV) were 0.40, 1.55, 1.75, 1.67 and 1.00 for animals receiving unfortified amaranth diet, those fed diet fortified with NaFeEDTA, ferrous fumarate, FeSO<sub>4</sub> and casein fortified with FeSO<sub>4</sub> respectively. RBV of the unfortified cereal was 40% of control suggesting perhaps low Fe absorption from the amaranth cereal. Based on the results of this study, amaranth cereal is ideal as a food vehicle for Fe fortification. The Fe fortificant of choice is ferrous fumarate. AA

348

Ologunde (MO), Akinyemiju (AO), Adewusi (SRA), Afolabi (OA), Shepard (RL), Oke (OL). **Chemical evaluation of exotic grain amaranth seed planted**



Chemical and nutrient properties of 3 var. *Amaranthus caudatus*, *A. hybridus* and *A. hypochondriacus* were in the range: protein 18.2 plus or minus 1.2%; carbohydrate 65.2 plus or minus 2.4%; crude fat 5.7 plus or minus 0.7% and total dietary fibre 19.6 plus or minus 5.7% all comparable to those of the parent stock. Nutritive macrominerals, K, Mg, Ca, microminerals, Cu, Fe, Zn, essential amino acids, lysine (4.8 g/16 g N) and sulphur containing amino acids (3.8 g/16 g N) were high. Phytate (5.90 - 23.50 mg phytate g<sup>-1</sup> defatted meal) and tannins (0.03 - 1.12%) were of comparable levels with other grains. The lipid fraction was very rich in unsaturated fatty acids (76.2 plus or minus 1.6%). SD

349

Sushma Sawhney and Shobhana Bhide. **Isolation of a lectin from *Amaranthus paniculatus* seeds.** *Journal of Food Science and Technology (India)* 29(6): 1992: 354-356

A N-acetyl- $\alpha$ -D-galactosamine specific lectin from the seeds of *Amaranthus paniculatus* was purified to homogeneity by affinity chromatography on immobilized desialyated porcine gastric mucin and found to be a homo dimer and a glycoprotein (10.5% carbohydrate w/w) with mol. wt. of the subunit being 27,000 (plus or minus 1410). Its amino acid composition revealed high contents of valine, leucine, and acidic amino acid residues. This lectin also had high contents of methionine, tryptophan and lysine. *A. paniculatus* lectin agglutinated normal and papain-treated rabbit and human A, B and O erythrocytes. AA

## Plantains

### Plantain flour

350

Ukhun (ME) and Ukpebor (IE). **Production of instant plantain flour, sensory evaluation and physico-chemical changes during storage.** *Food Chemistry* 42(3): 1991: 287-299

Instant plantain flours from ripe and unripe plantain fingers prepared by cooking, oven dehydration at 76°C and 80 - 90°C were stored at 5 plus or minus 1°C and at 22 plus or minus 4°C. Flours from ripe plantain were more acceptable, had higher moisture, total sugar, and lower pH, ascorbic acid, Na, K, P, Ca and Fe than flours from unripe plantain. The product can be used as base for baby weaning foods, puddings, soups and gravies. SD

## Tomatoes

351

Deniston (MF), Kimball (RN), Stoforos (NG) and Parkinson (KS). **Effect of steam/air mixtures on thermal processing of an induced convection-heating product (tomato concentrate) in a steritort.** *Journal of Food Process Engineering* 15(1): 1992: 49-64

The effect of reel speed, can size, and percent air during steam and steam/air processing in a Steritort on the heating rate of tomato concentrate (an induced convection-heating product) was investigated. A Taylor expansion equation, relating Ball process times with the above 3 variables, considering first order, second order, and interaction effects, was presented. A correlation equation for the Nusselt number as a function of the Reynolds and Prandtl numbers, the can length over the diam. ratio, and the steam content was also presented. Percent reduction in process lethality increased with increasing can size and air content, and decreasing reel speed and target lethality. Increase in percent air in the steam/air mixture could be compensated by an increase of the rotational speed. AA

352

Albel Singh, Singh (Y) and Sanjeev Batheja. **Suitability of packaging boxes for tomatoes.** *Journal of Food Science and Technology (India)* 29(6): 1992: 381-383

Textural properties of tomato were evaluated with different packaging conditions on vibration table under simulated transportation. The colour of tomatoes changed from greenish to pink to red. Firmness decreased and decay increased with longer duration of vibration and storage period. AA

## FRUITS

353

Conte (J), El Blidi (A), Rigal (L) and Torres (L). **Ethylene removal in fruit storage rooms: A catalytic oxidation reactor at low temperature.** *Journal of Food Engineering* 15(4): 1992: 313-329

During post-harvest conservation, climacteric fruit release ethylene whose accumulation speeds maturation, senescence and degradation processes in conserved fruits. The performance of an ethylene removal reactor working by catalysis at low temp. is studied. The main factors studied are catalyst temp., ethylene concn., flow rate of air-ethylene



gaseous mixture and catalyst mass. Work based on the exp. designs (uniform shell design) of Doehlert yielded a better knowledge on the influence of the different factors studied and facilitated the optimisation of the conditions of ethylene removal. The catalytic procedure used ensures a very efficient oxidation with an efficiency of 100% at a temp. between 100 and 120°C. A commercial prototype has been devised by extrapolation of the results obtained on a lab. scale. AA

354

Fourie (PC), Hansmann (CF) and Wium (GL). **Effects of fresh fruit characteristics and cold storage on the quality of dried apricots and peaches.** *Journal of Horticultural Science* 67(1): 1992: 59-65

The effects of a 2 wk cold storage period and fresh fruit characteristics on the quality of dried 'Peeka' apricots and 'Elberta' peaches were studied. The total soluble solids content of fresh apricots and peaches were both negatively correlated with the drying ratio. The ideal fresh size for production of large and extra-large dried apricots was 40 mm and larger, and for large dried peaches between 55 mm and 70 mm. Cold storage before drying had no detrimental effect on the quality of dried fruit and can be used effectively to extend the processing season. AA

355

Papadopoulou-Mourkidou (E). **Postharvest-applied agrochemicals and their residues in fresh fruits and vegetables.** *Journal of the Association of Official Analytical Chemists* 74(5): 1991: 745-765

The persistence and distribution of residues in the edible portions of fresh fruits and vegetables of post-harvest applied agrochemicals is presented in this review. The fruits reported are citrus fruits, pome fruits, stone fruits, mangoes, strawberries, bananas, kiwi fruits, avocados, some minor fruit commodities and bell pepper and tomatoes. Data on the persistence and residues of the fungicides, fumigants, insecticides, the antiscald compounds and the growth regulators are presented and discussed. 245 references. BV

356

Medlicott (AP), Semple (AJ), Thompson (AJ), Blackbourne (HR) and Thompson (AK). **Measurement of colour changes in ripening bananas and mangoes by instrumental, chemical and visual assessments.** *Tropical Agriculture* 69(2): 1992: 161-166

Mangoes (Julie cv.) were stored in sealed lid buckets with ethylene free humidified air and placed in

cabinets at 20 plus or minus 1°C. Similarly bananas (Valery cv.) were first ethylene treated and stored like mangoes. TSS, pulp rupture force, colour score by visual and Hunter values upto 6 days and chlorophyll and carotenoids upto 9 days were studied. There were significant correlations between visual colour scores and Hunter values: between visual colour scores and chlorophyll but not between visual colour scores and carotenoid. In banana peel colour showed significant correlations to pulp firmness and TSS but in mango the peel colour change was delayed to the changes in pulp firmness and TSS. SD

## Apples

357

Barrett (DM), Lee (CY) and Liu (FW). **Changes in the activity and subcellular distribution of PPO in 'delicious' apples during controlled atmosphere storage.** *Journal of Food Biochemistry* 15(3): 1991: 185-199

Changes in polyphenol oxidase (PPO) activity were sooner in apples stored under high CO<sub>2</sub> conditions (2.5 - 6% O<sub>2</sub>, 8 - 12% CO<sub>2</sub>) than those under normal conditions (2% O<sub>2</sub>, 3% CO<sub>2</sub>). GS

358

Barrett (DM), Lee (C) and Lui (FW). **Changes in 'Delicious' apple browning and softening during controlled atmosphere storage.** *Journal of Food Quality* 14(6): 1991: 443-453

'Delicious' apples stored in controlled atm. (CA) for 7 - 14 wks showed significant losses in polyphenol oxidase activity, browning tendency, firmness and electrolyte leakage (reached max. at 11.5 wks) with total phenolics remaining constant due to membrane integrity loss and decompartmentalization. The changes in these characteristics accelerate in air after removing from CA storage. SD

## Bananas

359

Satyan (S), Scott (KJ) and Graham (D). **Storage of banana bunches in sealed polyethylene tubes.** *Journal of Horticultural Science* 67(2): 1992: 283-287

Bunches of banana cv. Williams were obtained on 7 occasions over a 2 yr period from Coffs Harbour, New South Wales and treated with 0.1% benomyl to reduce rotting. Treatments were randomly applied to the branches as follows: (I) no treatment, (II) sealed in a polyethylene tube (thickness 0.1 mm), (III) sealed in a polyethylene tube (thickness 0.1 mm)

containing 100 g vermiculite impregnated with a saturated sol. of  $\text{KMnO}_4$  to remove ethylene. The bunches were held on each occasion at either 28, 20 or 13°C. The av. storage life was increased 2 - 3 times (over control) when the bunches were held in sealed polyethylene tubes and increased 3 - 4 times when an ethylene absorbent was packed with the bunch in the polyethylene tubes. The use of the sealed polyethylene tubes and ethylene absorbent allowed a storage life of up to 6 wks at 20 - 28°C and 16 wks at 13°C. The storage life of the bunches was limited by the presence of high concn. of  $\text{CO}_2$  and/or ethylene in the atm. or the development of bunch stalk rot. Better control of these factors might produce a further increase in storage life. AA

## Grapes

360

Raju (KS). **Marketing of grapes around Hyderabad city.** *Andhra Agricultural Journal* 37(4): 1990: 428

Identification of marketing channels, estimation of input costs and returns to producer, role of pre-harvest contractor, wholesaler, commission agent, retailer, vendor and the consumer was carried for Anab-e-Shahi and Thompson seedless grape var. The price variation between the consumer and the producer was Rs. 4/Kg for Thompson seedless var. The producer's share in the consumer rupee is 0.60 paise for Anab-e-Shahi and 0.65 paise for Thompson seedless. GS

## Pears

361

Rizzolo (A), Sodi (C) and Polesello (A). **Influence of ethylene removal on the volatile development in passa crassana pears stored in a controlled atmosphere.** *Food Chemistry* 42(3): 1991: 275-285

The volatile cold room atm. delayed the ripening of pears stored with ethylene removal as indicated by the physico-chemical analysis of the fruit as well. The high-boiling volatile substances (decadecanoate esters) gradually increased in fruit pulp of both types of storage (with ethylene removal and non-removal) and reached half the total at the end of 25 wks storage. After post-storage ripening at room temp. the disappearance of pentyl acetate, ethyl propanoate and hexanal and appearance of butyl acetate and hexyl acetate in the fruit flesh were ascertained. After maturation the high-boiling compound differed according to the storage mode. The ratio high-boiling/low-boiling compounds and the acceptance scores of sensory evaluations showed significant correlation. SD

362

Drake (SR), Cavalieri (R) and Kupferman (EM). **Quality attributes of D'Anjou pears after different wax drying temperatures and refrigerated storage.** *Journal of Food Quality* 14(6): 1991: 455-465

Waxed hot (60°C) and cold (0°C) dried pears exhibited lower external but higher internal concn. of  $\text{CO}_2$  than non-waxed fruits. After prolonged storage waxed cold dried pears required more time to develop the characteristic ripe yellow colour and retained firmness longer than either waxed hot dried or non-waxed pears. Waxed hot dried pears were slower to develop yellow colour and retained firmness longer than non-waxed pears. Pears waxed after harvest or after 90 days of cold storage demonstrated increased ripening time. SD

## Pineapples

363

Van Lelyveld (LJ), Visser (GJ) and Swarts (DH). **The effect of various storage temperatures on peroxidase activity and protein PAGE gel electrophoresis 'Queen' pineapple fruit.** *Journal of Horticultural Science* 66(5): 1991: 629-634

Mature 'Queen' pineapple fruit were stored for 30 days at various temp. and afterwards examined for internal quality. A storage temp. of 8°C is at present generally accepted as the optimum. It was found that peroxidases (PO) activity is correlated with storage temp. and the appearance of storage injury symptoms. High storage temp. of 10, 12 and 16°C resulted in a high PO activity with internal browning of the core and pulp whereas temp. of 2, 4 and 6°C resulted in a low PO activity and white watery pulp. To verify these results, polyacrylamide gel electrophoresis was carried out with the proteins in the fruit. The difference in the 2 extreme temp. of 2°C and 16°C resulted in a high intensity of high mol. mass proteins at 2°C and an increase in intensity of low mol. mass proteins at 16°C. There is a distinct "change over" of these protein band intensities at 8 and 12°C. It is presumed that the correct storage temp. will be within these 2 limits. AA

## Strawberries

364

Morris (JR), Main (GL) and Sistrunk (WA). **Relationship of treatment of fresh strawberries to the quality of frozen fruit and preserves.** *Journal of Food Quality* 14(6): 1991: 467-479



Three processing exp. - 0.18% Ca dips, 0.3% low methoxyl pectin, 40°Brix sucrose dips, heat of 70°C, vacuum at 172 mm Hg and drying to 70% moisture with frozen-then-thawed and preserved 'Cardinal' strawberries, showed that firming effect due to Ca and pectin was more with sliced fruits than the whole fruits. Drained wt. loss was reduced by pectin, Ca, sucrose, heat and vacuum in frozen-then-thawed fruits but it was the same or greater among treatments in preserves. The firmness and wholeness of preserves was increased by Ca, vacuum, 40°Brix sucrose, heat and to a lesser extent drying, but individual effects were not additive. The drying treatment reduced colour quality. SD

## CONFECTIONERY, STARCH AND SUGAR

### Honeys

365

Ghoshdastidar (N) and Charkrabarti (J). **Studies on hydroxy methyl furfural formation during storage of honey.** *Journal of Food Science and Technology (India)* 29(6); 1992: 399-400

The changes in hydroxy methyl furfural (HMF) during honey storage and utility of Fiehe and aniline chloride tests to detect low levels of HMF were studied. Usefulness of parameters like fructose/dextrose ratio, acidity and organoleptic quality as possible indices of honey deterioration has been reported. Formation of HMF appears to be auto-catalytic. AA

### Starch

366

Vasanthan (T) and Hoover (R). **A comparative study of the composition of lipids associated with starch granules from various botanical sources.** *Food Chemistry* 43(1); 1992: 19-27

Acid hydrolysis and extraction by selective solvents gave 96.3 - 98.6% lipids from purified wheat, rice, corn, fababean, lentil, potato and cassava starches. The free lipids in chloroform-methanol (CM) extracts (% total starch lipid) ranged from 5% (corn) to 62% (fababean) and free and bound lipids in n-propanol-water (PW) extracts from 44.2% (potato) to 94.8% (corn). In CM extracts neutral lipids (NL) were the major class. In PW extracts, NL were major class in corn and cassava; NL and phospholipids (PL) in potato and PL in wheat, rice and fababean. The free fatty acid composition of lipids was also analysed. SD

367

Steeneken (PAM) and Woortman (AJJ). **Estimation of the length of liquid threads in aqueous starch pastes.** *Food Hydrocolloids* 5(1/2); 1991: 147-149

A method is presented for the measurement of the length of liquid threads in aqueous starch pastes by means of a video technique. The liquid delivery system can be adopted to flow conditions encountered in practice. The thread length increases with starch concn. and was found to be highly dependent on the type of starch. AA

368

Biliaderis (CG). **Structures and phase transitions of starch in food systems.** *Food Technology* 46(6); 1992: 98-100, 102, 104, 106, 108-109, 145

Analysis of mol. structures of starch that can lead to improvements in the quality and shelf-life of starch-containing foods are described in this article. Aspects covered are the phase transitions of granular starch, retrograded starch structures polymorphism and properties of V-amylase. CSA

369

Waniska (RD) and Gomez (MH). **Dispersion behaviour of starch.** *Food Technology* 46(6); 1992: 110, 112, 117-118, 123

Measurement of dispersion of starch in excess water, porridges, parboiled sorghum, foods prepared by extrusion such as snacks and breakfast cereals and the study of the dispersion behaviour of starch in foods can reveal the processing and storage history of the food. CSA

370

Kokini (JL), Lai (L-S) and Chedid (LL). **Effect of starch structure on starch rheological properties.** *Food Technology* 46(6); 1992: 124, 126, 128, 130, 132, 134, 136, 138-139

This article reviews some aspects of starch viscosity-structure relationships in excess and limited water environments and as a function of pressure and extrusion and rheological model for extrusion cooking. 60 references. CSA

371

Godshall (MA) and Solms (J). **Flavour and sweetener interactions with starch.** *Food Technology* 46(6); 1992: 140, 142, 144-145

Experimental and analytical techniques that have been developed to study the interaction of starch with flavour and aroma compounds on mol. basis.

equilibrium aspects, analytical methods and its application is discussed. The interaction between starch and sweetener that affect the baking quality and flavour perception of foods is also discussed. CSA

372

Yackel (WC) and Cox (C). **Application of starch-based fat replacers.** *Food Technology* 46(6): 1992; 146-148

Reducing the fat content of foods through the use of fat replacers requires proper ingredient selection and reformulation to match the properties of the full-fat products. Various products that have been successfully reformulated to reduce the fat content are baked goods, dressings, dairy products, meat products, frozen desserts, frostings, sauces and gravies. CSA

373

Kim (CS) and Walker (CE). **Effects of sugars and emulsifiers on starch gelatinization evaluated by differential scanning calorimetry.** *Cereal Chemistry* 69(2): 1992; 212-217

Differential scanning calorimetry (DSC) was used to evaluate the effects of sugar and emulsifier interactions on gelatinization temp. of 3 different starches. A constant wt. ratio of starch to sugar to water (1:1.5:1.5), typical in high-ratio cake batters, was used in the DSC. Sucrose exhibited a greater effect than glucose on raising gelatinization temp. However, with lactose, typical complete gelatinization endotherms could not be observed because of the peak for large lactose crystal melting. Therefore, the solubility of the sugars may have an important effect on starch gelatinization. Low emulsifier concn. (0.6%) did not appear to change DSC starch gelatinization temp. Sugars and emulsifiers may interact and affect the gelatinization temp. ranges. AA

## Sugar

374

Kapur (P). **Measurement of degree of supersaturation based on conductivity, viscosity and temperature properties of sugar crystallisation process in the sugar industry.** *Proceedings of the 54th Annual Convection of the Sugar Technologist's Association of India* M37-M43; 1992

A microprocessor based pan monitoring system (MIPMOS) designed by the Central Electronics Engineering Research Institute, Pilani, India, was used in various factories for on-line measurement of

sugar crystallisation parameter such as brix, purity, super saturation and massecuite properties including electrical conductivity, a.c. resistivity, viscosity and temp. The computation and display of pan-parameters with the conventional hardwired analog or digital circuitry based systems is difficult and the MIPMOS proved very convenient. GS

375

Sharma (DP). **Falling film evaporator.** *Proceedings of the 54th Annual Convection of the Sugar Technologist's Association of India* M63-M66; 1992

Falling film evaporators are used for best juices and its usefulness for cane juices is attempted. It is used as the 1st body or vapour cell and the precautions to be observed are listed; cost is considered to be the main limitation in its use for cane juices. KAR

376

Lonkar (MY), Bhojaraj (SK) and Gavande (CN). **Falling film evaporator: A potential application to Indian sugar industry.** *Proceedings of the 54th Annual Convection of the Sugar Technologist's Association of India* M77-M85; 1992

Usefulness of adopting falling film evaporator (FFE) in Indian sugar mills is considered based on trial run conducted at M/s Purna SSK Ltd., Busmathinagar, India. FFE reduced the sugar losses due to inversion to min. and the steam saving aspect is also maintained. FFE needs exhaust steam pressure of normal range 0.6 - 0.7 kg/cm<sup>2</sup> g for effective functioning, whereas the rising film evaporator needs 1.2 kg/cm<sup>2</sup> g steam. KAR

377

Peris-Tortajada (M), Puchades (R) and Maquieira (A). **Determination of reducing sugars by the neocuproine method using flow injection analysis.** *Food Chemistry* 43(1): 1992; 65-69

Dialysis was found to be an excellent time saving alternative to decoloration with charcoal when the most suitable Bran Lubbe type C membrane was used and the results correlated significantly with batch method. SD

## Massecuite

378

Chandramauli (R). **Continuous pan brief note on design and performance of 'B' massecuite production.** *Proceedings of the 54th Annual Convection of the Sugar Technologist's Association of India* M67-M75; 1992



A continuous pan of 20 t/h capacity for 'B' massecuite is designed. It can boil 20 t of 'B' massecuite/h as required at 94 - 97°Brix and 74 - 77 purity with 0.3 to 0.4 mm crystal size. The steam/vapour factor is 0.4. The design features are described, specifications and technical data of continuous pan are given. The continuous pan performance is compared with the batch, and it is concluded that this will result in significant contribution to saving of cost due to space required, economy of steam and energy. KAR

## Sugarcane

379

Chalapathi (K). **A note on post-harvest loss in sugarcane weight on staling.** *Proceedings of the 54th Annual Convection of the Sugar Technologist's Association of India* Ag57-Ag59; 1992

Five cane var. (CO.C 671, CO.6415, CO.7219, CO.62175 and CO.419) were tested for loss in wt. up to 120 h (6 days) after harvest. The loss in wt. at 120 h after harvest was 7.14% for CO.C671, 13.04% for CO.6415, 7.5% for CO.7219, 9.09% for CO.62175 and 24.21% for CO.419. After harvest, loss in wt. was fast in CO.419 and CO.6415. KAR

380

Das (YG). **Gearless driver for driving cane sugar mills.** *Proceedings of the 54th Annual Convection of the Sugar Technologist's Association of India* E1-E4; 1992

An evaluation of gearless drive hydraulic motors in different sugar mills in India is reported. These are used for getting optimum speeds of mills and max. extraction and for max. crushing without affecting extraction. Working details of the system in a sugar mill are given. KAR

381

Singh (M). **New concept in evaporator system design.** *Proceedings of the 54th Annual Convection of the Sugar Technologist's Association of India* E5-E11; 1992

A new system of evaporation to meet the requirements of desired evaporation and steam/fuel balance is proposed. The process conditions relevant to heating evaporation and boiling are listed. This system, will result in capital saving of one million rupees and lower the maintenance, replacement and operating costs. KAR

382

Lal (C). **Automatic sugar filling and weighing system.** *Proceedings of the 54th Annual Convection*

*of the Sugar Technologist's Association of India* E13-E16; 1992

An auto sugar bagging system, to replace the present weightment done on over weighbridges is described. The system accuracy is plus or minus 100 g for 100 kg weightment. The system saves manpower in packing and reduces handling cost. KAR

383

Srinivasan (S) and Gurugovind (J). **Simple means to save steam.** *Proceedings of the 54th Annual Convection of the Sugar Technologist's Association of India* M19-M27; 1992

Steam economy in sugar factories could be done by avoiding pan boiling technique. A falling film evaporator was devised to streamline the rate of steam/vapour consumption and to avoid changes in steam requirement. About 4 to 5% steam on cane is saved by this method. Even at lower crushing rate, the steam % cane could be maintained between 48 and 50% on cane. GS

384

Ramalingam (M) and Vijayendran (V). **A comparative study of condensing and cooling system.** *Proceedings of the 54th Annual Convection of the Sugar Technologist's Association of India* M29-M36; 1992

Multijet co-current, barometric co-current and barometric counter current types of condensers were compared for their efficiency and power consumption. Barometric counter current condenser with water air ejector coupled with cooling tower was the best with respect to efficiency and power consumption. Water air ejector is preferred as water does not get heated up, and is mixed directly in injection cold water channel. GS

## Sugarcane juices

385

Chavan (SM) and Jadhav (SJ). **Direct method for assay of starch in sugarcane juice and its products.** *Proceedings of the 54th Annual Convection of the Sugar Technologist's Association of India* G1-G16; 1992

A simple direct colorimetric method for starch detn. in sugarcane juice, plantation white sugar, molasses, syrup and massecuite is described. In this method the optical densities of blue starch iodine complex is measured with some modifications: it eliminates sucrose addition and avoids precipitation of starch with alcohol. Starch recovery by this method was 99.2% in plantation

white sugar, 97.5% in sugarcane juice and 97.4% in molasses. GS

386

Raj Kumar, Singh (V), Rastogi (S), Brar (P), Mehta (RN), Raina (P). **Initial trials with electrodialysis system for demineralisation of clear juice.** *Proceedings of the 54th Annual Convection of the Sugar Technologist's Association of India* M1-M18: 1992

A membrane process electrodialysis system involving separation of cations and anions by an ion exchange membrane is described. Demineralisation of sugarcane juice with this system showed following advantages: (i) quality of sugar cane juice improved due to removal of salts. Ash content reduced by 23 - 37%; K by 38 - 50%; Na by 10 - 35% and Ca by 15 - 30%; colour removal was 11 - 19%; purity rose by 1 - 2% and Brix drop was 3 - 6%; (ii) molasses formation reduced and saved sugar loss by 0.15% cane, (iii) cooling was not required for colour removal, (iv) scaling of heat exchangers was not required, and (v) retarded sugar crystallization problem was solved. GS

## BAKERY PRODUCTS

387

Ramadevi (M) and Vijaya Khader. **Use of ghee residue in baked products and chikki.** *Andhra Agricultural Journal* 37(4): 1990; 374-379

Utilization of ghee residues available in dairies was explored. Ginger biscuits, masala biscuits, cookies and chikki were prepared by incorporating ghee residue; the proximate composition and protein quality of the formulated products and the keeping quality of the products were determined after packing in 0.03 and 0.06 mm polyethylene bags and storing for 15 and 30 days. Ghee residue increased the protein content, but not the protein quality. All the products were acceptable at 25% level of ghee residue incorporation. *In vitro* digestibility of protein was 50%. The available lysine content in the baked product also decreased. Neither the thickness of polyethylene bag (0.03 and 0.06 mm) nor the storage period (30 days) in atmospheric temp. had any effect on the *in vitro* digestibility or on the content of available lysine. GS

388

Handoo (SK), Gupta (S) and Agarwal (TN). **Bakery shortening.** *Indian Baker* 22(4): 1991; 15-17

This article reviews the types, functions in baking process, quality, plasticity, consistency, creaming power and nutritional aspects of shortening. SD

389

Saxena (AK) and Bakhshi (AK). **Effect of mixing times, different sponges and of different ingredients on baking characteristics of flours.** *Indian Baker* 22(4): 1991; 29-36

Commercial wheat flours (roller mill) evaluated for mixing times, different additives and sponges for fermentation showed that 2 mixing time was favourable. addition of glycerol monostearate, fat, sugar and 40% sponge produced satisfactory loaves with better vol. and specific vol. with uniform crumb comparable to the quality of breads made from lab. milled flours. SD

390

Kometani (T), Kitatsuji (E) and Matsuno (R). **Baker's yeast mediated bioreduction: Practical procedure using EtOH as energy source.** *Journal of Fermentation Technology (Hakko Kogaku Zasshi)* 71(3): 1991; 197-199

Baker's yeast mediated bioreduction of prochiral ketones was investigated with respect to its energy source. The rate of glucose consumption was 5 times that of the reduction of ethyl acetoacetate (EA), and the reduction of EA proceeded under aerobic condition after glucose had been consumed. From these results, reduction by baker's yeast based on the regeneration system for NAD (P) H through the oxidative pathway of ethyl alcohol (EtOH) was developed. Under anaerobic conditions, reduction by the new procedure did not occur. The optimum conditions of EtOH concn. and temp. were about 200 mM and 30°C, respectively. At higher than 400 mM EtOH concn., the reduction soon leveled off. The rate of EtOH consumption was less than twice that of EA reduction, and no by-products except for CO<sub>2</sub> were detected, so the new procedure is a practical one. AA

391

Swyngedau (S) and Peleg (M). **Characterization and prediction of the compressive stress-strain relationship of layered arrays of spongy baked goods.** *Cereal Chemistry* 69(2): 1992; 217-221

The sigmoid compressive stress-strain curves of crumbs from 3 types of bread, pound cake, and double-layered arrays of these materials (0 - 70% deformation) are described by 2 kinds of 3-parameter mathematical models. The model structures were especially selected so that they could be transformed algebraically from stress-strain to strain-stress relationships or be determined



directly from the strain-stress data by nonlinear regression. The model parameters enabled calculation of a specimen's deformation-force relationship with any given dimensions. When an in-series array of objects having the same cross-sectional area is deformed uniaxially, the force along the array is the same and the deformation the sum of that of its components. Since sponge compression is not accompanied by a significant lateral expansion, the effects of friction between the layers can be neglected. This enabled the prediction of the force-deformation and stress-strain relationships of double-layered arrays with reasonable accuracy from the compression parameters of the components' material. AA

392

Kulkarni (SD). **Use of soybean in bakery products.** *Invention Intelligence* 26(8); 1991: 376-377

Bread prepared with 12% soy-fortified wheat flour contains 50% more protein and will be 3 times as rich in proteins as non-fortified bread due to balanced amino acid pattern. A var. of soy-fortified breads can be produced: 6% and 12% soy-fortified breads: pan bread with 6% soy flour by 70% sponge method; 100% sponge method and straight dough method; and French bread with 6% soy flour by 60% sponge method, 100% sponge method and straight dough method. Other products tried are yeast leavened doughnuts and cookies (with 6% soy flour). These methods can be considered for adoption. BV

## Bread

393

Sekhon (KS), Sharma (S) and Nagi (HPS). **Technology of flat bread production.** *Indian Baker* 22(4); 1991: 18-19

The recipe developed and baking schedule standardized are given. Flat bread made resembling *chapathi* in appearance was highly acceptable and showed PER similar to that of bread. Antistaling and antimold agents can be incorporated. Sodium stearoyl-2-lactylate and glycerolmonostearate at 0.5% level each reduced the hardness during storage. Addition of calcium propionate at 0.5% level prevented mold and extended shelf-life to 8 days at 37°C and 12 days at 4°C. SD

394

Indrani (D) and Venkateswara Rao (G). **Effect of improvers on the quality of whole wheat flour bread.** *Journal of Food Science and Technology (India)* 29(6); 1992: 357-359

Effect of improvers on the quality of whole wheat flour bread showed an increase in the specific loaf vol. to varied levels. Sodium stearoyl-2-lactylate showed highest response in improving the specific loaf vol. followed by polyoxyethylene sorbitan monostearate, glycerol-monostearate, polyoxyethylene sorbitan monopalmitate, diacetyl tartaric acid esters of monoglycerides and soya lecithin. The crumb characteristics of whole wheat flour bread are also improved, while the crust shape, crumb colour and typical wheaty taste of whole wheat flour bread were unaffected. AA

395

Indrani (D) and Venkateswara Rao (G). **Effect of ingredients on the quality of whole wheat flour bread.** *Journal of Food Science and Technology (India)* 29(6); 1992: 360-363

The improvement in the quality of whole wheat flour bread with 8% fat, 0.5% sodium stearoyl-2-lactylate (SSL) and 20 p.p.m. potassium bromate was better by sponge and dough method compared to that by straight dough and mechanical dough development methods. The specific loaf vol. decreased with the increase in sugar content beyond 5.0% in straight dough and sponge and dough methods but remained unaffected in mechanical dough development method. Max. increase in specific loaf vol. was caused by 200 p.p.m. ascorbic acid in mechanical dough development method and by 0.5% SSL in straight dough and sponge and dough methods. With optimum levels of all ingredients, max. improvement in the quality of whole wheat flour bread was obtained by sponge and dough method. AA

## Cakes

396

Sinha (LK). **Baking of batter type cakes: Quality factors, fault and remedy.** *Indian Baker* 22(4); 1991: 21-27

Batter type cake is more popular among the 3 types. The functional properties of ingredients, formula standardization, leavening and mixing methods, baking and cooling loss, baking temp. and different types of defects, causes and remedial measures are presented in detail. SD

397

Kim (CS) and Walker (CE). **Interactions between starches, sugars and emulsifiers in high-ratio cake model systems.** *Cereal Chemistry* 69(2); 1992: 206-212



The cake flour in a high-ratio cake model system was replaced by a blend of commercial wheat starch, vital gluten, and a lipid mixture of lecithin and ethoxylated mono-diglycerides. Then the wheat starch in the control formula was replaced with corn or potato starch. Lactose or dextrose (glucose) replaced 50% of the sucrose, and additional emulsifier, sucrose ester F-160, or polysorbate 60 also was used. Potato starch produced acceptable cakes, whereas corn starch did not. A 50% dextrose replacement for sucrose improved the cake vol. and grain structure with corn starch. The potato starch, lactose and polysorbate 60 combination produced a significant increase in batter viscosity, but this was not true for corn starch batters containing lactose. The increased batter viscosity tended to aid in air incorporation. Both additional emulsifiers improved all cake vol. The addition of polysorbate 60 to the wheat starch batter containing lactose produced the highest cake vol. with the best grain structure. Dextrose tended to retain more cake crumb moisture. Partial flour replacement by commercial starches might be beneficial in high-ratio cake baking, if proper combinations of starch, sugar, water and emulsifier are used. AA

## Cookies

398

Gaines (CG), Kassuba (A) and Finney (PL). **Instrumental measurement of cookie hardness. I. Assessment of methods.** *Cereal Chemistry* 69(2): 1992; 115-119

Probing and a 3-point break technique for instrumental measurement of cookie hardness were appraised. Both techniques were used to evaluate the hardness of cookies produced by 3 lab. formulations: the AACC micromethod and macromethod for sugar-snap cookies and a new commercial formula for wire-cut cookies. The 3 formulas differ in their ratios of sugar, shortening, and water. Both instrumental and sensory measurements indicated that wire-cut formula cookies were the least hard of the 3 formulations. The 3-point break technique measured both hardness and brittleness, but the probe technique required less product. Probing was used to assess differences among 4 wheat cvs and effects of postbake age on cookie hardness. Least significant differences and variances for probing data (as a percentage of the range of hardness observed with the 4 cvs) were usually smallest for the wire-cut formula cookies. AA

399

Gaines (CS), Kassuba (A), Finney (PL) and Donelson (JR). **Instrumental measurement of cookie**

**hardness. II. Application to product quality variables.** *Cereal Chemistry* 69(2): 1992; 120-125

A probing technique was used to measure the effects of various treatment on the hardness of cookies produced by two lab. formulations, the AACC micromethod for sugar-snap cookies and a new formula for wire-cut cookies typical of commercial products. The technique was able to quantify hardness differences associated with wheat cv, wheat class blending, quality of ingredients, cookie geometry, wheat test wt., kernel shriveling, crop year, and flour protein content. Higher protein content and more kernel shriveling were associated with harder cookies. Higher flour protein content resulted in harder wire-cut formula cookies (as is usually observed in commercial baking); however, sugar-snap cookies were thicker and less hard. Probing was also used to evaluate the hardness of cookies produced from two pairs of flours that were fractionated and then reconstituted with one to three fractions interchanged. Fractions that contributed positively to cookie hardness were tailings, gluten and water-solubles. Fractions appeared to contribute to hardness in the order of their hydrophobicity. AA

400

Nishibori (S) and Kawakishi (S). **Effect of various sugars on the quality of baked cookies.** *Cereal Chemistry* 69(2): 1992; 160-163

The quality of cookies baked with pentoses, hexoses and di- and trisaccharides, cookie doughs prepared from wheat flour, eggs, butter, sugar and sodium bicarbonate were heated at 150°C for 10 min in an electric oven was studied. The baked cookies were extracted with methanol-water (3:1, v/v), and the extracts were analyzed by HPLC. A main peak from the cookie extracts containing pentoses was isolated and identified as furfural. The peaks from the cookies containing sugars other than pentoses were 2,3-dihydro-3,4-dihydroxy-5-acetylfuran (DDAF), 2,3-dihydro-3,5-dihydroxy-6-methyl-4(H)-pyran-4-one (DDMP), and 5-hydroxymethylfurfural (HMF). DDAF and DDMP appeared in batches that included hexoses. DDAF and DDMP produce sweetness and cookie like flavour; hexoses as sweeteners are thus useful in the formation of good cookie flavor. Results indicated on the physical properties of cookies - vol. expansion, form colour, and surface condition - suggest that difference in cookies made with various sugars result from differences in melting point temp. and solubility. The results also indicate that of all the baked cookies studied, those with fructose exhibit the most favourable physical properties and flavour. AA



401

Mani (K), Eliasson (A-C), Lindahl (L) and Tragardh (C). **Rheological properties and breadmaking quality of wheat flour doughs made with different dough mixers.** *Cereal Chemistry* 69(2): 1992: 222-225

Four dough mixers - farinograph, mixograph, Krups, and Hobart - were used to make wheat flour doughs. Two sizes of farinograph mixers, with flour capacities of 10 g and 300 g, were tested. Dynamic rheological properties of the doughs were measured with a cone-and-plate system. The storage modulus ( $G'$ ) decreased with mixing time at different rates depending on the severity of mixing. Mixing was most severe with the mixograph and Krups mixers. As the dough rested, it became more elastic, and the phase angle decreased. Rheological properties were related to the empirical measurements (farinogram and mixogram) and to the results of test baking. A good correlation was observed between the farinogram and storage modulus values. With the mixograph, however, the empirical optimum was reached 1 min later than the optimum determined from the fundamental rheological measurements and baking tests. The storage modulus and phase angle values associated with the optimum quality of the finished product were fairly constant and did not depend on the mixing equipment. For the specific blend of flour used (approx. 70% winter wheat of the var. Kosack and Folke and 30% spring wheat of the var. Kadett), the best quality bread (as indicated by loaf vol. and porosity) was obtained when the av. storage modulus was approx. 12 kPa. AA

## MILK AND DAIRY PRODUCTS

402

Jackson (LS) and Lee (K). **The effect of dairy products on iron availability.** *CRC Critical Reviews in Food Science and Nutrition* 31(4): 1992: 259-270

This review is a critical evaluation of the literature dealing with the interactions between dairy products and Fe availability. Aspects covered include: Fe availability in milk (cow's milk, human milk) and effect of milk components on Fe availability (protein, casein, whey protein, lactoferrin and other minor proteins and mechanism of inhibition), Ca and phosphate. 86 references. BV

403

De Jong (P), Bouman (S) and van der Linden (HJLJ). **Fouling of heat treatment equipment in relation**

**to the denaturation of  $\beta$ -lactoglobulin.** *Journal of the Society of Dairy Technology* 45(1): 1992: 3-8

The relationship between the denaturation of  $\beta$ -lactoglobulin ( $\beta$ -lg) and the deposition of milk constituents in a heat exchanger was investigated. Experiments were carried out on a plate heat exchanger with skim milk by applying different temp.-time combinations in the temp. range 70 to 122°C. The aggregation of  $\beta$ -lg was measured by HPLC, and the amount of deposits on the plates of the heat exchanger was determined by chemical oxygen demand measurements. Based on the results of the experiments, a fouling model at temp. up to 100°C is proposed and some measures to reduce the amount of deposits by more than 50% are given. AA

## Milk

404

Grufferty (MB) and Mulvihill (DM). **Emulsifying and foaming properties of protein isolates prepared from heated milks.** *Journal of the Society of Dairy Technology* 44(1): 1991: 13-19

Surface activities at the air-water interface and the emulsifying and foaming properties of sodium caseinate, conventional casein-whey protein co-precipitate prepared from milk heated at 90°C x 15 min at pH 6.6 and milk protein isolates prepared from milks heated at 90°C x 15 min at pH 7.5 or at 60°C x 3 min at pH 10.0 were determined. The surface activities of the 4 proteins at the air-water interface were similar, while the emulsifying capacity and emulsion stabilizing ability of casein was less than that of the milk protein isolates or the conventional co-precipitate. Fat surface areas formed on emulsification with the 4 proteins were similar and increased with increasing power input. Total protein adsorbed at the interface and protein load (mg protein/m<sup>2</sup> fat) for the emulsions stabilized by sodium caseinate and the milk protein isolate prepared from the milk heated at 90°C x 15 min at pH 7.5 were similar and lower than those for emulsions stabilized by the other 2 proteins. Foam overruns followed the order: sodium caseinate > milk protein isolate prepared from milk heated at 90°C x 15 min, pH 7.5 > milk protein isolate prepared from milk heated at 60°C x 3 min, pH 10.0 > conventional co-precipitate, while foam stabilities followed the reverse order. AA

405

Muir (DD), Hunter (EA) and West (IG). **Optimization of the properties of dried skim milk for use in white sauce suitable for use with frozen products.** *Journal of the Society of Dairy Technology* 44(1): 1991: 20-23



The relation between the composition of dried skim milk and the texture and viscosity of white sauce in which the powder was a major ingredient has been investigated. The level of whey protein denaturation was inversely related to sauce viscosity. Modest increases in protein content of the powder, achieved by ultrafiltration, led to improvements in viscosity of white sauce. The effects were retained against a wide range of experimental protocols and both freshly prepared sauces and sauces which had been frozen then recooked.. AA

406

Griffiths (MW), Banks (JM), McIntyre (I) and Limons (A). **Some insight into the mechanism of inhibition of psychrotrophic bacterial growth in raw milk by lactic acid bacteria.** *Journal of the Society of Dairy Technology* 44(1); 1991; 24-29

Addition of lactic acid bacteria to refrigerated raw milk inhibited growth of Gram-negative psychrotrophic bacteria. In order to obtain complete inhibition, population levels of lactic acid bacteria approaching  $1 \times 10^8$  cfu/ml were required. At this inoculum level a substantial pH change was observed in the milk during storage. The degree of inhibition was related to the final pH of the milk. Inhibition of the psychrotrophs was brought about by adjustment of pH with L(+) lactic acid but not by HCl. Inhibition by the lactic acid bacteria was observed in heat-treated milks seeded with a small vol. of raw milk, but no inhibition of Gram-negative psychrotrophic growth was observed when cell-free preparations of lactic acid bacteria were used. A cell-free ultrafiltrate of one lactic acid culture did inhibit a strain of *Bacillus circulans*. AA

407

Pal (MA), Yadav (PL) and Sanyal (MK). **Physico-chemical and sensory characteristics of low-fat paneer from high heated milk.** *Indian Journal of Dairy Science* 44(7); 1991; 437-441

The av. values of physico-chemical properteis of low-fat paneer made by heating a mixture of cow and buffalo milk (1:1) separately at 118 and 90°C showed significant increase ( $P < 0.05$ ) in yield but decrease ( $P < 0.05$ ) in fat content at 118°C than at 90°C. The values for protein, lactose, fat (on DM basis), ash, titratable acidity, pH and moisture absorption capacity between the 2 types were nonsignificant. Low-fat paneer made from milk, heated at 118°C scored higher ( $P < 0.05$ ) for body and texture, odour, taste and for overall acceptability than paneer made from milk heated at 90°C. Loss of fat in whey at 118°C was also significantly less ( $P < 0.05$ ) than at 90°C. Results indicate that heating milk at 118°C without holding resulted in higher yield of low-fat

paneer with better sensory characteristics and also lower loss of solids in whey. SRA

408

Adhikari (AK) and Singhal (OP). **Changes in the flavour profile of indirectly heated UHT milk during storage: Effect of Maillard browning and some factors affecting it.** *Indian Journal of Dairy Science* 44(7); 1991; 442-448

Indirectly heated UHT milk (at 140°C/3 sec. and packed in poly laminated tetrapak) was stored at 22 and 37°C to study the effect of some factors on Maillard browning which lead to stale flavour and bitter taste during storage. Both free and total Hydroxy-methylfurfural (HMF) content reduced sharply within 14 days of storage at both the storage temp. Thereafter, they increased significantly till spoilage. Free HMF content increased from 2.91 to 7.85 and 7.04  $\mu$ moles/L and total HMF content increased from 7.87 to 26.77 and 21.87  $\mu$ moles/l at 37 and 22°C respectively after 33 days of storage. Sharp reduction (about 50% within 17 days) in free sulphhydryl compounds (-SH groups) due to highgih dissolved oxygen content (7.89 p.p.m.) improved the flavour score initially but subsequently resulted in development of pronounced stale flavour and bitter taste earlier at 37°C (within 22-24 days) than at 22°C (after 25-26 days), making the product unacceptable after 26 - 28 days. The pH values dropped from 6.82 to 6.45 and 6.52 at 37 and 22°C respectively after 33 days. Free -SH compounds had a definite inhibitory effect on Maillard browning at the early stages of storage but dissolved oxygen enhanced it by reducing -SH compounds in later stages. AA

409

Shilton (NC), Johnson (A) and Lewis (MJ). **An investigation of a possible relationship between the ethanol stability of milk and the fouling of milk in an ultra high temperature process.** *Journal of the Society of Dairy Technology* 45(1); 1992; 9-10

## Goat milk

410

Shiv Ram and Sindhu (JS). **Salt balance and heat stability of goat milk as affected by pH.** *Indian Journal of Animal Science* 61(7); 1991; 753-756

About one-fourth of the Ca, half of the P, 65 to 70% Mg and 80% citrate (cit) were in the dissolved phase of milk. Ratios of Ca/P, (Ca + Mg)/P and (Ca + Mg)/(P + cit) were < unity indicating a preponderance of polyvalent anions over such cations, more so in the dissolved form. The ratio of all cations to all anions was higher than one



establishing a higher concn. of monovalent-cations in goat milk. Average HCT at 130°C was 17 min for individual goats. High concn. of Na significantly increased the HCT but a high concn. of cit in skim milk or in the dissolved phase significantly decreased it. The effect of dissolved Ca was similar to that of citrate. In composite milk samples a significant and positive correlation between HCT and pH, and a negative correlation between HCT and citrate were observed. AA

## Milk products

411

Prajapathi (PS), Gupta (SK), Patil (GR) and Patel (AA). **Cost estimation of butter flavoured low-fat spread.** *Indian Journal of Dairy Science* 44(6); 1991; 384-388

The cost of production of butter flavoured low-fat spread (40% fat) for a 4 tonnes/day plant was Rs. 34.80/kg. The cost of raw material accounted for 63.1% of the total costs, whereas processing and packaging, and general expenses (marketing and distribution) accounted for 23.4 and 13.5% of the total cost respectively. BV

## Cheese

412

Rodriguez (E), Martin (R), Garcia (T), Azcona (JI), Sanz (B), Hernandez (PE). **Indirect ELISA for detection of goats' milk in ewes' milk and cheese.** *International Journal of Food Science and Technology* 26(5); 1991; 457-465

An indirect ELISA (enzyme-linked immunosorbent assay) has been developed successfully for the detection of defined amounts of goats' milk (1 - 25%) in ewes' milk and cheese. The assay uses polyclonal antibodies raised in rabbits against goats' caseins (GC). The anti-GC antibodies were recovered from the crude antiserum by immunoadsorption and elution from a column containing immobilized goats' caseins. The anti-GC antibodies were biotinylated and rendered goats' milk specific by mixing them with lyophilized bovine and ovine caseins. The assay was developed in a non-competitive ELISA format and it comprised coating plates with extracts from samples. ExtrAvidin-peroxidase was used to detect the biotinylated anti-GC antibodies bound to goats' caseins immobilized on 96-well plates. The colour developed by the subsequent enzymic conversion of the substrate resulted in discernible differences in optical densities when assaying mixtures of ewes' milk and cheese containing variable amounts of goats' milk. AA

413

Bertola (NC), Bevilacqua (AE) and Zaritzky (NE). **Changes in rheological and viscoelastic properties and protein breakdown during the ripening of 'Port Salut Argentino' cheese.** *International Journal of Food Science and Technology* 26(5); 1991; 467-478

Changes in the rheological behaviour and viscoelastic properties during ripening at 10°C of a soft cheese (Port Salut Argentino) packaged in a plastic film (EVA-EVA) were analysed. Casein degradation was measured by electrophoresis slab gels;  $\alpha_{s1}$  casein degradation was rapid and striking compared with that of  $\beta$ -casein. Rheological parameters obtained from uniaxial compression tests changed during ripening: hardness decreased, adhesiveness and cohesiveness increased. An exponential decay equation with 2 Maxwellian elements and one elastic in parallel was fitted to characterize stress relaxation curves. Viscoelastic parameters (elastic moduli and relaxation times) were obtained using non-linear regression analysis. The elastic equilibrium modulus decreased 80% during the ripening period and the viscosity of the element with the highest relaxation time decreased 20%. The parameters represented the changes observed in cheese hardness and elasticity during ageing time and were related to the extent of casein breakdown. AA

## Cheddar cheese

414

Patel (HG), Upadhyay (KG) and Pandya (AJ). **Effect of milk acidity at setting and whey acidity at draining on the residual rennet activity in buffalo milk Cheddar cheese.** *Indian Journal of Dairy Science* 44(7); 1991; 427-430

Results showed no significant change in pH, titratable acidity or coagulant retention in milk acidities set at different levels. An increase in whey acidity at draining upto 0.18%, significantly increased the acidity of resultant cheese. The values of residual coagulant activity were higher compared to cow milk Cheddar cheese. SRA

## Chhana spread

415

Tewari (BD) and Sachdeva (S). **Effect of processing variables on quality of spread prepared from Chhana.** *Indian Journal of Dairy Science* 44(6); 1991; 375-379

A good flavoured and spreadable chhana spread could be made from cow and buffalo milk chhana

containing 62.5 and 63.5% moisture respectively. The pH of the most acceptable spread was 5.0. Addition of emulsifier and heat treatment did not improve the body and texture of the spread. Addition of 30% *chakka* (fermented milk product) or 20% ripened Cheddar cheese further improved the sensory quality of the spread. SRA

416

Joshi (SV), Majgoakar (SV) and Toro (VA). **Effect of different coagulants on yield and sensory quality of Chhanna prepared from milk of cow, buffalo and goat.** *Indian Journal of Dairy Science* 44(6): 1991: 380-383

Buffalo milk produced significantly higher yield of *Chhanna* as compared to cow and goat milk. *Chhanna* prepared from buffalo milk had hard body and coarse texture. Cow and goat milk produced *chhanna* with soft body and smooth texture. *Chhanna* from cow and buffalo milks had acceptable flavour whereas that from goat milk had slightly acidic flavour. The yield of *chhanna* did not vary significantly due to different coagulants. Lactic, tartaric and citric acids produced *chhanna* with soft body, whereas lemon juice resulted in *chhanna* with slightly hard body. On the basis of total sensory scores, lactic was the best. AA

#### Dahi

417

Turamabekar (SV) and Kulkarni (MB). **Studies on the particle size distribution of mixed milk dahi.** *Indian Journal of Dairy Science* 44(7): 1991: 449-452

The incubation period (12, 17, 22 and 27 h) had significant effect on the particle size-distribution of mixed milk *dahi* (MMD). The different layers of MMD (top, middle, bottom) showed different particle size distribution pattern. The mean particle size of MMD ranged from 272.5  $\mu\text{m}$  to 5.95 mm, with the small sized particles (1 mm to 45  $\mu\text{m}$ ) dominating the curd mass irrespective of the incubation period, pH or layer height of MMD. SRA

418

Jogand (SB), Lembhe (AP), Ambedkar (RK) and Chopade (SS). **Incorporation of additives to improve the quality of dahi.** *Indian Journal of Dairy Science* 44(7): 1991: 459-460

Addition of 0.1% sodium alginate or gelation or 1% starch as additives can overcome the whey off problem and improve the quality of *dahi*. SRA

#### Ghee

419

Wadhwa (BK) and Jain (MK). **Production of ghee from butter oil - a review.** *Indian Journal of Dairy Science* 44(6): 1991: 372-374

This review presents the various approaches (skim milk dahi/dahi powder, flavour concentrates and synthetic flavour compounds) for simultaneous simulation of ghee flavour in butter oil (BO). The various flavour simulation studies suggest possible innovations in making ghee via BO and to improve its shelf-life. The conversion of BO into flavoured BO introduces a diversification in Indian dairy industry. 8 references. BV

#### Gulab jamun

420

Prajapati (PS), Thakar (PN), Miyani (RV) and Upadhyay (KG). **Influence of use of khoa prepared from concentrated milk on quality of gulab jamun.** *Indian Journal of Dairy Science* 44(6): 1991: 395-397

Gulab jamuns prepared from different *Khoa* were evaluated for chemical composition, rheological properties and sensory quality. The total solids (TS) of 3 different types of *gulab jamun* ranged between 70.96 to 72.98% and were statistically at par with each other. The product made with *khoa* from conc. milk had higher fat content, lower protein content and were higher sugar absorbants. The products made with 40% TS conc. milk were soft and products made with 50% TS conc. milk were hard. The flavour score of product made from 40% TS *khoa* was slightly lower (30.0) whereas use of 50% TS *khoa* for *gulab jamun* preparation gave slightly higher flavour score (31.9). An improved body and texture score was obtained in *gulab jamun* prepared from *khoa* having 40 and 50% TS conc. milk as compared to control. The results of the present study also indicates the manufacturing cost reduction due to reduction in steam consumption and saving in labour and time for *khoa* preparation by the use of vacuum conc. milk. SRA

#### Ice creams

421

Cheema (AS) and Arora (KL). **Cost estimation for filled ice-cream.** *Indian Journal of Animal Science* 61(7): 1991: 742-746

The cost of manufacture of filled ice-cream was compared with that of control ice-cream. The milk fat and 3 types of vegetable oils, viz. groundnut, soybean and corn, were used for the manufacture of control and filled ice-creams. The cost per 100 ml



was Rs. 1.12, Rs. 1.07 and Rs. 1.12 respectively, against Rs. 1.29 for control ice-cream. These were cheaper by 13 - 17%. AA

## Khoa

422

Ranganadham (M) and Rajorhia (GS). **Tray drying of khoa.** *Indian Journal of Dairy Science* 44(6); 1991: 398-400

The rate of drying in the tray process is affected by temp. of drying, moisture content (MC) in the product, air pressure in the drying chamber, particle size and bed thickness of the product in the trays. Samples of *khoa* were dried at 50, 60, 70°C and MC of 30, 20 and 15%. Preliminary trails showed that temp. above 70°C caused intensive browning and grittiness in the final product. The rate of drying during first 30 min was constant at all temp. Vacuum drying of *khoa* resulted in a faster rate of evaporation. The time required for dehydrating from 20% moisture to 4% was 82 min under vacuum and 98 min in ordinary hot air dryer. Size of *khoa* particles caused significant changes in drying curves. Larger size particles took longer time to dry than smaller particles. The amount of material loaded in a given area also affected the rate of drying. SRA

## Yoghurts

423

Vedamuthu (ER). **The yoghurt story - past present and future.** *Dairy, Food and Environmental Sanitation* 11(9); 1991: 513-514

Covers yoghurt quality (shelf-life) and sources of fungal contamination of yoghurt. BV

424

Vedamuthu (ER). **The yoghurt story - past, present and future. Part VII.** *Dairy, Food and Environmental Sanitation* 11(10); 1991: 583-585

Covers varieties of yoghurt, manufacture of yoghurt drinks and research and development needs. BV

425

Ulberth (F). **Headspace gas chromatographic estimation of some yoghurt volatiles.** *Journal of the Association of Official Analytical Chemists* 74(4); 1991: 630-634

A headspace GC method is described for the detn. of acetaldehyde, ethanol, acetone, diacetyl, and 2-butanone in yoghurt. Yoghurt (2 g) is equilibrated

1 h in a 10 ml vial at 60°C, and 0.25 ml headspace gas is split-injected. The volatiles are baseline-separated in < 5 min by using a thick film capillary column coated with SE-54. An external standard calibration method fulfills the requirements for an accurate detn. of the yoghurt aroma components. The accuracy of this method was checked by the standard addition method. The precision of the method, in terms of the relative standard deviation, depends on the analyte concn. At the 10 p.p.m. volatile level, RSD is 2%, and at the 0.1 p.p.m. level, 15%. AA

## Milk proteins

426

Dickinson (E), Hunt (JA) and Dalglish (DG). **Competitive adsorption of phosvitin with milk proteins in oil-in-water emulsion.** *Food Hydrocolloids* 4(5); 1991: 403-414

Competitive adsorption at pH 7 has been investigated at the emulsion droplet surface and the planar oil-water interface for binary mixtures of the egg-yolk protein, phosvitin, and a milk protein,  $\beta$ -casein or  $\beta$ -lactoglobulin. Analysis of the aqueous phase of *n*-tetradecane-in-water emulsions made with a mixture of phosvitin + milk protein (0.5 wt.% total protein) indicates that the milk protein predominates at the surface. This is thermodynamically consistent with the much lower surface activity of phosvitin at the *n*-tetradecane-water interface. In exp. involving addition of milk protein after emulsification,  $\beta$ -casein displaces 70% of adsorbed phosvitin within a few min, and then another 10% over a period of 48 h, whereas  $\beta$ -lactoglobulin displaces 57% within a few min, but none thereafter. Taken together with previous results for the competitive adsorption of different milk proteins, the data are used to discuss how the time-dependent displacement behaviour of a disordered protein  $\beta$ -casein differs from that of a structured globular protein  $\beta$ -lactoglobulin. Special features of the adsorption behaviour of phosvitin are related to its high level of phosphorylation and its high charge density. AA

## Caseins

427

Surve (SS) and Mahoney (RR). **Thermal stabilization of four microbial  $\beta$ -galactosidases by histidine, casein amino acids and casein.** *Journal of Food Biochemistry* 201-207; 1991

Casein amino acids were not effective in the thermal stabilization of 4 microbial (*Escherichia coli*, *Kluyveromyces marxianus*, *Streptococcus thermophilus* and *Aspergillus oryzae*)



$\beta$ -galactosidases as compared to casein. For the *K. marxianus* enzyme, histidine alone was as effective as casein and the stabilizing effect was proportional to the logarithm of the histidine concn. BV

## MEAT AND POULTRY

### Meat

428

Mohamed Ali (LH) and Heath (JL). **Effect of muscle fibre orientation on *Pectoralis superficialis* muscle expansion in NaCl solutions.** *Journal of Food Processing Preservation* 15(5): 1991: 303-314

Volume of broiler chicken muscle significantly increased with increased concn. of NaCl. Also expansion was significantly different, less along the longitudinal axes of the muscle fibre, more along the perpendicular to the longitudinal axes and so on indicating that muscle fibre orientation needs to be considered where tissue expansion and absorption characteristics are involved. SD

429

Okonkwo (TM), Obanu (ZA) and Ledward (DA). **Characteristics of some intermediate moisture smoked meats.** *Meat Science* 31(2): 1992: 135-145

Intermediate moisture smoked beef was prepared by cook-soak/equilibration in a sol. containing NaCl, sodium nitrite and potassium sorbate. Two further sol. contained glycerol and glycerol + 'onion' in addition to the above ingredients. half the samples in each treatment group were smoked for 18 h (heavy smoking) and the others for 4 h (light smoking) at 50°C. All samples developed the pink-red colour of nitrite cured meat but those treated with glycerol were darker, presumably due to decreased moisture contents. Glycerol increased the apparent moisture, fat and sodium dodecyl sulphate (SDS) soluble protein contents and also improved the conversion of haemoproteins to the cooked cured form but decreased the percent soluble hydroxyproline. Smoking caused a marked decrease in moisture, SDS-soluble protein and soluble hydroxyproline contents and slightly decreased the available lysine and percent conversion of the haemoproteins to the cured nitroso forms. Smoking also caused increased darkening and hardness of the samples. Total viable aerobes, coliforms and fungi were below the levels of detection while TBA values were low and all samples possessed no detectable rancidity. Electrophoretograms of the samples indicated that cooking/equilibration had no significant effects on the proteins present but smoking led to a slight loss of some of the protein components. AA

### Beef

430

Drumm (BM), McKenna (BM) and Joseph (RL). **Line chilling of beef 2: The effect on carcass temperature, weight loss and toughness.** *Journal of Food Engineering* 15(4): 1992: 285-312

The main objective of the work was to investigate the feasibility of replacing the present batch chilling process applied to beef carcasses, by a line or continuous process. Carcasses were cooled for 24 h in an exp. chill which was modified to simulate a chilling tunnel. Fans with infinitely variable speed controls, were used to blow chilled air over the round of each side. A data logger was used to record air temp., meat temp., air speeds, RH and the mass of one side at regular intervals. There was no significant difference between regimes with respect to toughness despite great variation in their severity. In order to reduce shrinkage from 1.2 to 0.8%, power consumption had to be more than doubled. Therefore chilling regimes need to be optimised (in economic terms). Orientation of sides with respect to fans was found to be an important factor affecting their cooling rate and shrinkage. AA

431

Skog (K), Jagerstad (M) and Laser Reuterswärd (A). **Inhibitory effect of carbohydrates on the formation of mutagens in fried beef patties.** *Food and Chemical Toxicology* 30(8): 1992: 681-688

Beef patties were prepared by mixing minced meat with water and either glucose (1.2 or 4%), lactose (1.2 or 4%) or powdered milk (2.4 or 8%) before frying. In another exp., minced meat was mixed with starch from golden bread crumbs (3%) or potatoes (4%), with and without glucose (1.2 or 4%). The patties (100 g) were fried for 3 min at 150 or 180°C in double-sided fryer. The mutagenic activity in the crust was determined using the Ames test. With the addition of glucose or lactose (1-4%), the mutagenic activity was inhibited by 34 - 76%. A similar inhibition of the mutagenic activity was obtained with powdered milk. However, starch from golden bread crumbs or potatoes caused only a slight (not significant) decrease in mutagenic activity whereas adding both starch and glucose to the beef patties inhibited mutagenic activity by up to 54%. AA

432

Findlay (CJ) and Barbut (S). **A response surface investigation of the effects of sodium chloride and tripolyphosphate on the thermal properties of beef muscle.** *Meat Science* 31(2): 1992: 155-164



Jackson (TC), Acuff (GR), Vanderzant (C), Sharp (TR) and Savell (JW). **Identification and evaluation of volatile compounds of vacuum and modified atmosphere packaged beef strip loins.** *Meat Science* 31(2): 1992: 175-190

434

Kesava Rao (V), Kowale (BN), Murthy (TRK) and Sharma (N). **Effect of processing and storage on neutral lipids of buffalo meat.** *Meat Science* 31(1): 1992: 25-34

Three muscles viz. *Triceps brachii* (TB), *Longissimus dorsi* (LD) and *Biceps femoris* (BF) from different anatomical locations of adult male buffaloes were stored after broiling and pressure cooking under refrigerated (4°C) condition for 3, 6, 9 days and 30, 60, 90 days under frozen (-10°C) storage. At the end of each storage interval they were analysed for total lipids, cholesterol contents and glyceride fractions i.e. monoglycerides (MG), diglycerides (DG), and triglycerides (TG). Muscles differed significantly in total lipids as well as contents of all glyceride fractions. Muscle LD had significantly higher total lipid content than TB and BF. Muscles differed significantly in their esterified cholesterol (EC) contents. Heat processing increased total lipids, cholesterol, MG, DG and TG contents of all the buffalo muscles studied. Total cholesterol contents remained unchanged during refrigerated and frozen storage. However, EC, MG, DG and TG contents declined during storage. The influence of anatomical locations on fatty acid composition of neutral lipids was observed. The ratio of unsaturated to saturated fatty acids increased due to cooking. A gradual decrease in mono- and polyunsaturated fatty acids was recorded during refrigerated and frozen storage. AA

435

Dransfield (E), Wakefield (DK) and Parkman (ID). **Modelling post-mortem tenderisation - I: Texture of electrically stimulated and non-stimulated beef.** *Meat Science* 31(1): 1992: 57-73

436

Dransfield (E), Etherington (DJ) and Taylor (MAJ). **Modelling post-mortem tenderisation - II: Enzyme changes during storage of electrically stimulated and non-stimulated beef.** *Meat Science* 31(1): 1992: 75-84

437

Dransfield (E). **Modelling post-mortem tenderisation - III: Role of calpain I in conditioning.** *Meat Science* 31(1): 1992: 85-94

## Pork

438

Grant (IR) and Patterson (MF). **Effect of irradiation and modified atmosphere packaging on the microbiological and sensory quality of pork stored at refrigeration temperatures.** *International Journal of Food Science and Technology* 26(5): 1991: 507-519

The effect of combining low-dose irradiation (1.75 kGy) with modified atm. packaging (MAP) on the microbiological and sensory quality of pork chops stored at refrigeration temp. was studied. The microflora of irradiated MAP pork was almost exclusively composed of lactic acid bacteria, predominantly *Lactobacillus* spp. Modified atm. containing either 25 or 50% CO<sub>2</sub>, balance N<sub>2</sub>, resulted in the best microbial control in irradiated pork held at 4°C, compared to an unirradiated MAP control, and these atmospheres were subsequently used in sensory studies. The atm. containing 25% CO<sub>2</sub>:75% N<sub>2</sub> maintained the uncooked colour and odour of irradiated pork chops more effectively than 50% CO<sub>2</sub>:50% N<sub>2</sub>. Therefore packaging in a modified atm. containing 25% CO<sub>2</sub>, balance N<sub>2</sub>, followed by irradiation to a dose of 1.75 kGy is recommended to improve the microbiological and sensory quality of pork chops. AA

439

Grant (IR) and Patterson (MF). **Effect of irradiation and modified atmosphere packaging on the microbiological safety of minced pork stored under temperature abuse conditions.** *International Journal of Food Science and Technology* 26(5): 1991: 521-533

The safety of irradiated pork packed in 25% CO<sub>2</sub>:75% N<sub>2</sub> and stored at abuse temp. (10 or 15°C) was assessed by inoculation studies involving *Salmonella typhimurium*, *Listeria monocytogenes*, *Escherichia coli*, *Yersinia enterocolitica* and *Clostridium perfringens*. Irradiation to a dose of 1.75 kGy reduced pathogen numbers to below the detection limit of 10<sup>2</sup> cells g<sup>-1</sup>. When higher inoculum levels were used (10<sup>6</sup> cells g<sup>-1</sup>) irradiation at 1.75 kGy reduced pathogen numbers by 1 - > 5log<sub>10</sub> cycles depending on strain. *Clostridium perfringens* was the most resistant, and *Y. enterocolitica* the most sensitive of the pathogens studied. In all cases when high numbers (10<sup>6</sup> to 10<sup>7</sup> g<sup>-1</sup>) of spoilage and/or pathogenic bacteria were present initially on the pork the meat appeared spoiled, and although irradiation reduced the number of microorganisms, the meat was still unacceptable from a sensory viewpoint after treatment. It was concluded that the



microbiological safety of irradiated, modified atm. packaged (MAP) pork is better than that of unirradiated MAP pork. AA

440

Monahan (FJ), Buckley (DJ), Morrissey (PA), Lynch (PB) and Gray (JI). **Influence of dietary fat and  $\alpha$ -tocopherol supplementation on lipid oxidation in pork.** *Meat Science* 31(2); 1992; 229-241

441

Nanu (E) and Narayan (KG). **Enterotoxin production by *Staphylococci* isolated from pork kabab, Salami and other sources by ELISA.** *Journal of Food Science and Technology (India)* 29(6); 1992; 383-384

The studies on enterotoxin production by staphylococci isolated from pork, kabab, salami and other sources as detected with ELISA, indicated the production of toxin by both coagulase positive and negative isolates. Few of the isolates produced enterotoxins C and D, while others produced either B, C or D toxins. The quantity of enterotoxin C produced by the isolates was in the range of 20 - 45  $\mu$ g/ml. AA

442

Miri (A), Talmont (A), Renou (JP) and Monin (G).  **$^{31}\text{P}$  NMR study of postmortem changes in pig muscle.** *Meat Science* 31(2); 1992; 165-173

443

Essen-Gustavsson (B), Karlstrom (K) and Lundstrom (K). **Muscle fibre characteristics and metabolic response at slaughter in pigs of different halothane genotypes and their relation to meat quality.** *Meat Science* 31(1); 1992; 1-11

## Products

444

Shahidi (F) and Hong (C). **Role of metal ions and heme pigments in autoxidation of heat-processed meat products.** *Food Chemistry* 42(3); 1991; 339-346

The effect of myoglobin (Mb), hemoglobin (Hb), hemin (Hm) and the preformed cooked cured-meat pigment (CCMP), as well as Fe(II), Fe(III), Cu(I) and Cu(II) on the oxidative stability of cooked comminuted pork was studied over a 21 day storage at 4°C. All these compounds, except CCMP, showed pro-oxidant activity. The pro-oxidant effect of metal ions was more pronounced at their lower oxidation state, as measured by the 2-TBA test. Addition of chelators, disodium salt of ethylenediaminetetraacetic acid and to a lesser

extent sodium tripolyphosphate, inhibited the pro-oxidant activity of the above compounds. Addition of metal ions to the meats after cooking similarly enhanced the autoxidation of lipids in the above systems, thus reflecting the importance of processing conditions and equipment wear-out on the oxidative state of precooked meat products. AA

445

Rogov (IA), Kovalev (YI), Tokaev (ES) and Tokeev (AA). **Collagen and its rational content in meat products. 2. Experiments with growing rats.** *Meat Science* 31(2); 1992; 147-153

446

Hand (LW), Mandigo (RW) and Calkins (CR). **The effects of preblending time on physical and textural properties of coarse ground sausages.** *Meat Science* 31(1); 1992; 13-24

The effects of preblending storage time on physical and textural properties of coarse ground sausages were characterized.<sup>9</sup> Raw materials (pork, beef) were preblended at 0-2°C and held for 0, 4, 8, 12, 16, 48, 96, 144, 196 or 240 h just prior to manufacture into Polish sausages. Expressible moisture (EM), raw batter stability, processing yield (PY), Instron compression (CO) and protein solubilization (SEM micrographs) increased from 0 to 16 h. No differences were observed for EM, PY and CO and in SEM micrographs for the 48 - 240 h interval. The effects of storage of preblends on sausage physical and textural properties (raw batter stability, yield, cohesiveness, SEM micrographs) occurred rapidly (0 - 16 h), reached a max. and either remained constant or diminished as storage time increased from 48 to 240 h. AA

447

Rogov (IA), Tokaev (ES), Kovalev (YI) and Tolstoguzov (VB). **Collagen and its rational content in meat products. Part. 1. Analytical studies.** *Meat Science* 31(1); 1992; 35-42

Computer-assisted simulation has been used to study the effect of collagen content on the biological value of meat proteins. It has been shown that an increase in the collagen content from 2.5% to 15 - 20% of the total amount of proteins contained in minced meat tangibly enhances proteins utilization for tissue synthesis. Hence, the above collagen content in meat products heightens their nutritional and biological value and renders them more suited for human metabolism. AA



448

Yetim (H), Gokalp (HY), Kaya (M), Yanar (M) and Ockerman (HW). **Physical, chemical and organoleptic characteristics of Turkish style frankfurters made with an emulsion containing Turkish soy flour.** *Meat Science* 31(1): 1992: 43-56

The possibility of using Turkish Defatted Soy Flour (DSF) to replace part of the meat in Turkish style frankfurters was studied and the technological, physical, chemical, nutritional, sensory and quality characteristics of these sausages produced under Turkish conditions were determined. No significant difference in physical and sensory properties between the control group (all meat) and treatment groups (5, 10 and 20% soy flour) was found. DSF up to the level used significantly ( $P > 0.01$ ) increased moisture and protein and decreased fat levels of the sausages. The amino acid and PER results also indicated that replacing meat with DSF in sausages did not significantly alter the nutritional value of the sausages. AA

### Kababs

449

Mir Salahuddin, Kondaiah (N) and Anjaneyulu (ASR). **Effect of phosphate on the quality of buffalo meat kababs.** *International Journal of Animal Sciences* 6(1): 1991: 27-32

The effect of tetrasodium pyrophosphate, at 0.5% level was studied on the quality of kababs prepared from hot, chilled and frozen conditions, of buffalo meat. Hand mix (dough) was prepared and kababs were moulded on skewers and charbroiled. Emulsion stability and pH of mix, yield and taste panel scores of the charbroiled kababs were used as criteria for evaluation. The addition of phosphate increased the pH by more than 0.3 unit and significantly improved the emulsion stability and yield. Taste panel scores were better for all the parameters of appearance, flavour, juiciness, texture and overall acceptability. The yield of kababs increased by 4.36% (hot meat), 5.24% (chilled meat) and 6.07% (frozen meat) due to the addition of phosphate. The yield ranged from 77.74 to 80.22% in control compared to 82.98 to 84.58% in phosphate added samples. The beneficial effect of phosphate was observed in all the 3 conditions of buffalo meat handling. AA

### Sausages

450

Ellerbroek (LI) and Steffen (G). **Effect of pasteurization and fermentation on residues of sulphonamides in sausages.** *International Journal of Food Science and Technology* 26(5): 1991: 479-483

The different effects of pasteurization and fermentation on sulphamethazine (SMZ) and sulphachlorpyridazine (SCP) were investigated in 2 common German meat products, luncheon meat and raw fermented sausages. There was no decrease in sulphonamide concn. ( $5 \mu\text{g g}^{-1}$ ) in luncheon meat during the different stages of processing and storage ( $4^{\circ}\text{C}$  up to 27 days). Less than 40% of the initial concn. remained in fermented sausages after ripening for 10 days in a climatized room. The sulphonamide content was reduced only if fermentation was involved in contrast with meat contaminated with other chemotherapeutic residues. AA

451

Katsaras (K) and Budras (K-D). **Microstructure of fermented sausage.** *Meat Science* 31(2): 1992: 121-134

A protein matrix is necessary for the desired texture of fermented sausages suitable for slicing. The formation of this network is predominantly induced by myosin and actin proteins. A change in the structure of native muscle proteins results from different technological processes such as chopping, salting and fermentation. During chopping with simultaneous release of meat proteins, the salt brings about a change in the original structure of proteins by swelling and partial sol. of myofibrils. The dissolved proteins are transformed into a thin fluid colloidal transition state, the so-called 'sol-state' with unstable coagulation bonds. During sausage ripening, as a result of denaturation by lactic-acid and due to gradual loss of water (drying), the unstable bonds are replaced by condensation bonds, and thus the sol-state is converted into the 'gel-state'. Both gel formation (condensation structure) and water evaporation (syneresis) result in the development of a matrix in fermented sausage and, consequently, in the texture of the sliceable product. AA

### Poultry

#### Chickens

452

Parinyasiri (T), Chen (TC) and Reed (RJ). **Yields and breading dispersion of chicken nuggets during deep-fat frying as affected by protein content of breading flour.** *Journal of Food Processing Preservation* 15(5): 1991: 369-376

Battered and breaded chicken nuggets with low protein breading flour had significantly higher ( $P < 0.05$ ) breading pickup than those with high protein flour. However, frying yields and batter and breading "drop" in the shortening were not affected ( $P > 0.05$ ) by the protein content of breading flour. The protein content of flour affected significantly ( $P < 0.05$ ) the dispersion of breading particles in shortening during deep fat frying e.g. the lower protein content resulted in greater concn. of suspended breading in the shortening. SD

453

Kondaiah (N), Anjaneyulu (ASR), Mir Salahuddin, Singh (RP) and Panda (B). **Effect of phosphate and spent hen yolk on the quality of chicken patties and kababs from spent hens.** *Journal of Food Science and Technology (India)* 29(6): 1992: 363-365

Addition of phosphate and ova yolk to chicken patties and kababs formulated with deboned meat and by-products (skin, gizzard and heart) from spent hens significantly improved emulsion stability, reduced cooking losses and imparted better acceptability to both the products. Shrinkage in diam. of patties was small and significantly lower in phosphate added samples. Sensory scores indicated significantly higher overall palatability scores in both cases. AA

## Broilers

454

Mahendrakar (NS), Khabade (VS), Jagannatha Rao (R), Latha (R) and Dani (NP). **Influence of feeding fish and poultry viscera silages to broiler chicks on their performance and meat quality.** *International Journal of Animal Sciences* 6(1): 1991: 19-26

Two exp. were conducted with Cobb broiler chicks to investigate the influence of incorporating silages of fish and poultry offals and their replacement effects for fish meal in the diets on their performance and meat quality. The autolysates were prepared by ensiling fresh water fish viscera and poultry intestines and mixed with deoiled rice bran as carbohydrate filler and dried. About 50% of the protein in the dried diet was contributed by the offal. The isonitrogenous and isocaloric diets were formulated including offal autolysates, fish meal, oilcakes and cereals. The results revealed that the growth and overall performance of chicks fed with offal autolysates was comparable with that of fish meal in the diets provided the quantity of animal protein content in the diet is the same. The offal autolysates could be included at the level contributing about 3% animal protein in the diet

replacing about 50% of the fish meal requirement of broiler chicks. Regarding organoleptic quality attributes of meat, inclusion of fish viscera autolysate resulted into fishy taint in muscle due to high visceral fat content. This problem could possibly be overcome by replacing visceral diet with commercial diet about a wk prior to slaughter. The offal autolysates also have a high fat content which serves as a source of energy. AA

## Turkeys

455

Arteaga (GE) and Nakai (S). **Thermal denaturation of turkey breast myosin under different conditions: Effect of temperature and pH, and reversibility of the denaturation.** *Meat Science* 31(2): 1992: 191-200

The thermal denaturation and renaturation of turkey breast myosin (TBM) under different conditions of pH and temp. was evaluated by circular dichroism. TBM unfolds upon heating, and the degree of unfolding was dependent on the pH and temp. The transition temp. ( $T_m$ ) of TBM at pH values of 6 and 12 was found to be  $40^\circ\text{C}$ , suggesting that TBM is more temp. sensitive than other myosins. Full reversibility of the thermal denaturation of TBM was usually present when TBM was heated for 5-30 min at  $40^\circ\text{C}$  for 5 min at  $50^\circ\text{C}$  and incubated for 24 h at  $4^\circ\text{C}$ . AA

## Products

### Eggs

456

Stephenson (P), Satchell (FB), Allen (G) and Andrews (WH). **Recovery of Salmonella from shell eggs.** *Journal of the Association of Official Analytical Chemists* 74(5): 1991: 821-826

A preenrichment procedure and a direct selective enrichment procedure were compared for recovery of *Salmonella* artificially inoculated into liquid whole egg, egg yolk, and egg albumen. For liquid whole egg and egg yolk, the 2 procedures were comparable. With egg albumen, however, pre-enrichment in lactose broth gave significantly higher recoveries than did direct selective enrichment in either selenite cystine or tetrathionate broths. The lactose pre-enrichment procedure was used to determine the survival of *S. enteritidis* in egg yolk and egg albumen over a period of 7 days. As shown by most probable number detn., counts of *S. enteritidis* inoculated into egg albumen decreased by 3 log units, whereas those in egg yolk did not change significantly. It is recommended, therefore, that



only the egg yolk be examined for this pathogen. In a comparison of 5 different pre-enrichment media (lactose broth, brain heart infusion broth, trypticase soy broth, buffered peptone water, and nutrient broth), lactose broth was some what less productive than the other 4 media for the recovery of *Salmonella* from egg yolks. Trypticase soy broth gave the highest recovery. AA

## SEAFOODS

457

Sukumaran (CT). **Seafood export via aluminium packaging.** *Packaging India* 24(6): 1992: 11-13

### Squids

458

Lin (J-K) and Ho (YS). **Hepatotoxicity and hepatocarcinogenicity in rats fed squid with or without exogenous nitrite.** *Food and Chemical Toxicology* 30(8): 1992: 695-702

The popular seafood squid contains high levels of naturally occurring amines such as dimethylamine (DMA), trimethylamine and trimethylamine-N-oxide (TMAO). The hepatotoxicity and hepatocarcinogenicity of squid with or without exogenous nitrite were investigated in rats. Acute necrosis including polymorphogenic neutrophil infiltration, haemorrhage and cholangiofibrosis were observed in the livers of most rats fed squid. Hepatocellular carcinoma (HCC) was induced in two out of 12 rats (16%) by feeding 10% squid in Purina rat chow for 10 months. The incidence of HCC was increased to 4 out of 10 rats (33%) when 0.3% NaNO<sub>2</sub> was added to the above diet. At the end of the exp. a marked elevation of serum  $\gamma$ -glutamate transferase was observed in treated groups, but no significant changes in the activities of serum glutamic-oxaloacetic transaminase and glutamic-pyruvic transaminase were detected. Vitamin C (0.3%) gave partial protection against hepatic damage. The concn. of DMA in squid is estimated to be 0.19%; this concn. did not induce HCC under the experimental conditions used. Therefore it is suggested that another major naturally occurring amine in squid, TMAO, could be one of the important factors involved in the induction of hepatotoxicity and hepatocarcinogenicity in rats. AA

### Fish

459

Senthil (A), Srikar (LN) and Vidya Sagar Reddy (G). **Effect of frozen storage on protease and lipase**

**activities of oil sardine and ribbon fish.** *Journal of Food Science and Technology (India)* 29(6): 1992: 392-394

Highest protease activity was observed in whole gut of oil sardine and ribbon fish. On the contrary, lipase activity was found to be the highest in liver of both the sp. Statistically, significant decreases in the activities of proteases and lipases were found to occur in various tissues of oil sardine and ribbon fish during frozen storage. AA

### Cod

460

LeBlanc (EL) and LeBlanc (RJ). **Determination of hydrophobicity and reactive groups in proteins of cod (*Gadus morhua*) muscle during frozen storage.** *Food Chemistry* 43(1): 1992: 3-11

Commercially harvested and processed fillets of Northern bank trawl cod, frozen stored for 300 days at -30, -22, -15 and -12°C were used in the study. Sarcoplasmic, myosin-rich and SDS-soluble protein fractions from each treatment were evaluated for surface hydrophobicity, total, available and unavailable SH-, SS-, aldehydes, free NH<sub>2</sub>- and ester-link content changes in hydrophobicity is caused in 3 fractions not only by increasing in SS-bonding, but also by ester links, aldehydes and free NH<sub>2</sub>-groups. SD

### Sardines

461

Beltran (A) and Moral (A). **The effects of fat content and storage temperature on the storage life of smoked sardine fillets (*Sardina pilchardus* W.) prepared from frozen sardine.** *Food Chemistry* 42(3): 1991: 347-356

Smoked fillets were made from sardines stored for 3 and 6 months at -18°C. Fillets made from 3 months frozen sardines or sardines with higher fat content were softened at 1°C storage. Fillets made from sardine with lower lipid content and stored at -18°C were rancid due to sharp drop in smoked flavour. Fillets made from sardines with lower fat content frozen for 6 months were affected in shelf-life due to the level of oxidation in the raw material. SD

## PROTEIN FOODS

462

Faughnan (KT) and Woodruff (MA). **Modified gas chromatographic/mass spectrometric method**

for determination of daminozide in high protein food products. *Journal of the Association of Official Analytical Chemists* 74(4): 1991: 682-692

A modified version of the Conditt and Baumgardner GC/MS method for detn. of daminozide in peanut butter and raw peanuts is described. Daminozide in the food product is hydrolyzed to unsymmetrical dimethylhydrazine (UDMH) by sodium hydroxide digestion. The generated UDMH is distilled from the food matrix and captured by reaction with salicylaldehyde in a condensation trap. Resulting high pH distillates generated by peanuts and peanut products are adjusted back to a pH of 5 - 6 through addition of glacial acetic acid. After thermal incubation and extraction into methylene chloride, salicylaldehyde dimethylhydrazone is separated from interferences by capillary GC and quantitated by MS using the selective ion monitoring (SIM) mode. Quantitation of daminozide is based on the ratio of the salicylaldehyde dimethylhydrazone molecular ion ( $m/z$  164) to the molecular ion ( $m/z$  153) of the internal standard, 4-nitroanisole. Confirmation of daminozide identity is determined by relative intensity of the  $m/z$  164 ion to the  $m/z$  120 ( $C_7H_4ON$ ) ion. Improved  $m/z$  164 ion intensity and reduction of neighbouring interferences due to acetic acid treatment permitted a daminozide detection limit of 0.005 p.p.m. in a 50 g sample and an associated 0.02 p.p.m. limit of quantitation. This modification is specific for high protein samples that generate high pH distillates such as peanuts and peanut products and is not specifically intended for analysis of low protein samples. AA

#### Infant foods

463

Del Valle (FR), Escobedo (M), Sanchez-Marroquin (A), Bourges (H), Bock (MA), Biemer (P). **Nitrogen balance in infants fed formulas containing amaranth or a soy-oats formula.** *Cereal Chemistry* 69(2): 1992: 156-159

A nitrogen balance study of 10 infants 5 to 18 months old compared 2 infant formulas containing amaranth (*Amaranthus cruentus*) with a soy-oats formula. Analysis of covariance techniques were used to investigate significant differences between types of formula with respect to nitrogen absorption and retention. Infant wt. and nitrogen intake were used as covariates in order to adjust the dependent variables to a constant level of each of these covariates. No significant differences ( $P$  less than or equal to 0.05) were found among the 3 formulas with respect to either nitrogen absorption or nitrogen retention. AA

#### ALCOHOLIC AND NON-ALCOHOLIC BEVERAGES

#### Alcoholic beverages

##### Beer

464

Kaneda (H), Kano (Y), Kamimura (M), Kawaskishi (S) and Osawa (T). **A study of beer staling using chemiluminescence analysis.** *Journal of the Institute of Brewing* 97(2): 1991: 105-110

The chemiluminescence (CL) analysis has been used to study beer staling. Several types of commercial Japanese beers were stored at 37°C and their CL development analysed at 60°C. The CL level in beer developed as the beer was stored to reach a max. level and then decreased. The sum of the CL intensities for the first 1 h showed a good relationship with staling degree as assessed in mean panel scores. It is postulated that the deterioration rates of beer might be assessed from the CL producing patterns in the fresh beers before storage. The presence of sulphite in beer depressed the CL production during its storage indicating that there is some contribution of sulphite to flavour stability due to its inhibitory effect on radical reactions in beer. AA

##### Wines

465

Ibe (A), Saito (K), Nakazato (M), Kikuchi (Y), Fujinuma (K), Nishima (T). **Quantitative determination of amines in wine by liquid chromatography.** *Journal of the Association of Official Analytical Chemists* 74(4): 1991: 695-698

A liquid chromatography (LC) procedure is described for the detn. by dansylation of the following 16 kinds of biogenic amines found in wine: monoethylamine (MM), ethylamine (EM), iso- and n-propylamine (Pr), iso- and n-butylamine (Bu), iso- and n-amylamine (Am), pyrrolidine (PY), 2-phenethylamine (PH), tryptamine (TR), putrescine (PU), cadaverine (CA), histamine (HI), tyramine (TY), and spermidine (SP). The amines in white and red wine were applied to a column of Amberlite CG-50 type I resin (Na-form) after the column had been washed with water and eluted with 1N HCl acid. This eluate was evaporated to dryness under reduced pressure and derivatized with dansyl chloride (DNS). LC separations were performed on Finepak SIL C 18S and LiChrosorb RP-8 columns with an acetonitrile-water elution gradient. In the survey of commercial wines by this method, most of the samples were found to contain 12 amines, including iso-Am, CA, PU, TY and others. The highest levels of these amines were 4.48 µg



PU/mL in red wine, and 5.11 µg iso-Am/mL in white wine. The total levels of amines in red wine were comparatively higher than in white wine. AA

## Non-alcoholic beverages

### Fruit juices

466

Kantasubrata (J) and Imamkhasani (S). **Analysis of additives in fruit juice using HPLC.** *ASEAN Food Journal* 6(4); 1991: 155-158

A method is described for the simultaneous estimation of saccharin, sorbic and benzoic acids (widely used preservatives in Indonesian commercial fruit juices) by HPLC using µ-Bondapak CN column and a mixture of 2% acetic acid/methanol (95:5) as eluent. The absorbance ratio at 2 wavelengths (254 and 240 nm) is used for confirming peak identity. SRA

### Grape juices

467

Rao (MA) and Cooley (HJ). **Role of cultivar and press aid in pressing characteristics and juice yields of crushed grapes.** *Journal of Food Process Engineering* 15(1); 1992: 65-79

The stress-vol. characteristics of crushed grape cvs: Baco Noir, Cabernet Sauvignon, Catawba, Cayuga White, Chardonnay, Concord, Delaware, Melody, Niagara, Johannisberg Riesling, and Seyval Blanc, with and without paper and rice hulls press aids were studied in an expression cell and an Instron Universal Testing Machine. The slopes of ln stress vs vol. in compression were significantly ( $P < 0.001$ ) dependent on the grape cv. Addition of 1 - 3% press aid by wt. decreased the magnitudes of slopes by about 11% with Seyval Blanc to about 51% with Catawba; i.e., the ease with which pressing could be performed increased with the addition of press aid. With Cabernet Sauvignon grapes, addition of press aid 0.5, 1.0 and 2.0% resulted in increase in slopes ranging between 14.7 and 24.9%. The slopes of the ln stress-ln time during the relaxation portion of the exp. were also significantly dependent ( $P < 0.001$ ) on the grape cv; the magnitudes of the slopes increased with the addition of 1 - 3% paper press aid. The juice yields were affected significantly ( $P < 0.001$ ) by the addition of paper press aid, with max. yields being obtained when 1 - 2% (w/w) paper press aid was added. As expected, juice yields (w/w%) were significantly dependent ( $P < 0.001$ ) on grape cvs. AA

### Jackfruit juices

468

Seow (CC) and Shanmugan (G). **Storage stability of canned jackfruit (*Artocarpus heterophyllus*) juice at tropical temperature.** *Journal of Food Science and Technology (India)* 29(6); 1992: 371-374

Internal plain tinplate can corrosion and depletion of vitamin C in canned jackfruit juice, with or without added nitrate were found to follow zero-order kinetics during storage at 30 - 50°C. The activation energy followed the order of Fe dissolution > tin dissolution > vitamin C depletion. The presence of nitrate accelerated all 3 processes without significantly ( $P < 0.05$ ) affecting  $E_a$  values. Based on a max. permissible tin level of 250 mg/kg, tin dissolution appeared to be the predominant factor limiting the shelf-life of the product rather than depletion of vitamin C. It was estimated that properly processed jackfruit juice packed in plain tinplate cans could keep well for > 17 months at storage temp. < 30°C and in the absence of corrosion accelerators such as nitrates. AA

### Tangerine juices

469

Ilantileke (SG), Ruba (ABJr) and Joglekar (HA). **Boiling point rise of concentrated Thai tangerine juices.** *Journal of Food Engineering* 15(3); 1991: 235-243

To improve the design and optimisation of multiple-effect evaporators, the boiling point rise (BPR) of Thai tangerine juice was determined at different solute concn. and operating pressures, ranging from 67.74 to 35.41°Brix and from 700 to 123 mbar, respectively. Having observed that the amount of sucrose hydrolysed during a series of heat treatments was negligible, a series of mathematical relationships was used to reconstruct the experimental BPR values, thus showing that a modified version of the Crapiste-Lozano model allowed a closer fit to the experimental data. AA

### Soft drinks

470

Krishna Murthy (MN), Rajalakshmi (S), Satyabodha (JA) and Nagaraja (KV). **A qualitative colorimetric test for brominated vegetable oil in soft drinks.** *Journal of the Association of Official Analytical Chemists* 74(4); 1991: 698-699

A simple and precise method of detecting brominated vegetable oil (BVO) in soft drinks is described. After extraction of BVO using diethyl ether, the concentrated ethereal sol. was treated with a small quantity of Zn dust to convert the

organic bromide to inorganic form; the sol. was subsequently treated with lead dioxide to liberate bromine. The bromine evolved was detected by means of fluorescein-impregnated filter paper strip that turns pink because eosin is formed. The test can detect as low as 10 p.p.m. (2 mg/200 ml) of BVO under experimental conditions. GC was carried out on sodium methoxide derivatives prepared from ether extract for quantitation. AA

## Tea

471

Sahin (Y), Nas (S) and Gokalp (HY). **Effect of shooting period, region of growth and processing method on the Fe and Mn content of tea determined by X-ray fluorescence.** *International Journal of Food Science and Technology* 26(5); 1991: 485-492

X-ray fluorescence (XRF) is an effective technique for qualitative and quantitative analysis of minerals in various agricultural products. Simplicity, high throughput and the possibility of automation make it useful for screening large numbers of samples. Samples of 138 fresh green, black tea and residue of this black tea after brewing were obtained from the Eastern Black Sea region of Turkey and analysed for Fe and Mn content using XRF. Such work appears not to have been reported so far. AA

472

Ravichandran (R) and Dhandapani (M). **Composition characteristics and potential uses of South Indian tea seeds.** *Journal of Food Science and Technology (India)* 29(6); 1992: 394-396

The analytical data on tea seed and the seed oil indicate the possible use of tea seed oil for edible purposes. AA

## FATS AND OILS

### Fats

473

Bergholz (CM). **Safety evaluation of olestra, a nonabsorbed fat-like replacement.** *CRC Critical Reviews In Food Science and Nutrition* 32(2); 1992: 141-146

Olestra is the mixture of the hexa-, hepta-, and octa esters of sucrose with long chain fatty acids from any edible oil. Its physical properties are comparable to those of triglycerides, but it is not digested by lipolytic enzymes or absorbed and

therefore is noncalorie. Technically, it can replace fat in a wide variety of foods and can be used to make cooked, baked, and fried foods lower in fat and calories. A Food Additive Petition is under review by the FDA, which is comprised of results of extensive testing in animals and humans. The major areas of investigation are metabolism and absorption, chronic toxicity, mutagenicity, carcinogenicity, reproductive and developmental toxicity, safety for gastrointestinal tract, nutrition, and the potential for olestra to affect absorption of drugs. This testing involved studies in 5 different species of animals and over 30 clinical investigations. The results of this research support the safety of olestra for use in foods. 18 references. AA

### Oils

474

Gordon (MH) and Griffith (RE). **Steryl ester analysis as an aid to the identification of oils in blends.** *Food Chemistry* 43(1); 1992: 71-78

A steryl ester-rich fraction isolated from 14 oil samples by TLC and analysed by GC and HPLC after optimizing conditions showed that GC was more sensitive, having the advantage of the separation of the residual triacylglycerols from steryl esters and found to be useful for identifying mixtures in oils. SD

475

Gavriilidou (V) and Boskou (D). **Chemical interesterification of olive oil-tristearin blends for margarines.** *International Journal of Food Science and Technology* 26(5); 1991: 451-456

Refined olive oil-glycerol tristearate blends were interesterified using sodium methoxide as catalyst. The glyceride structure of the randomized fats was studied and the relationship between the structure and physical properties was examined. The rearranged fats were investigated for Solid Fat Index, melting behaviour, consistency and spreadability and the values obtained were compared to those of zero-trans margarines or commercially available products prepared from hydrogenated olive oil and other vegetable oils. The 80:20 and 75:25 olive oil-tristearin blends after randomization have properties very close to those of soft tub and packet margarines. AA

### Palm oils

476

Manorama (R) and Rukmini (C). **Effect of processing on  $\beta$ -carotene retention in crude palm**



$\beta$ -Carotene ammounting to 70% of the total carotenes in Indian crude palm oil (CPO) was estimated around 370 p.p.m. by non-aqueous reverse phase HPLC method (UV-V detector at 450 nm) with a high sensitivity and accuracy. 70 - 88% of  $\beta$ -carotene was retained in baked, seasoned, deep fried and shallow fried foods but there was total loss at fourth frying stage of consecutive use of oil affecting sensory and physico-chemical properties. CPO being suitable for products like cake, upma, kichidi and suji halwa prepared by single frying for a short duration can be ideal for vitamin A supplementation to vulnerable children. SD

## SPICES AND CONDIMENTS

### Papads

477

Deepa (CR), Asna Urooj and Shashikala Puttaraj. **Effect of addition of soy flour on the quality characteristics of blackgram (*Phaseolus mungo* L.) Papads.** *Journal of Food Science and Technology (India)* 29(6): 1992: 385-387

The effect of addition of soy flour (10 - 70%) to blackgram papad making, showed no change in the dough texture, though rolling property was affected. Greater amounts of water were needed for mixing the dough with an increase in soy flour concn. Elasticity was reduced to a min. at 40% and was completely absent at 50 %. Quality characteristics remained the same for both the raw papads. However, the quality of fried papads decreased beyond 60% addition of soy flour. Acceptability decreased with increase in percent soy flour added. The results suggest that an addition of 30 - 40% of soy flour would not make a significant difference in the physical and sensory characteristics of blackgram papad. AA

### Spices

478

Srinivasan (K) and Sambaiah (K). **The effect of spices on cholesterol 7 $\alpha$ -hydroxylase activity and on serum and hepatic cholesterol levels in the rat.** *International Journal for Vitamin and Nutrition Research* 61(4): 1991: 364-369

The effect of feeding curcumin, capsaicin, ginger, mustard, black pepper and cumin on cholesterol and bile acid metabolism was studied in rats. The activity of hepatic cholesterol-7 $\alpha$ -hydroxylase, the

rate-limiting enzyme of bile acid biosynthesis, was significantly elevated in curcumin (turmeric), capsicum (red pepper), ginger and mustard treated animals. The enzyme activity was comparable to controls in black pepper and cumin fed rats. Serum and liver microsomal cholesterol contents were significantly higher in the curcumin and capsaicin treated animals. Thus, this study has suggested that the spices-turmeric, red pepper, ginger and mustard can stimulate the conversion of cholesterol to bile acids, an important pathway of elimination of cholesterol from the body. However, simultaneous stimulation of cholesterol synthesis by the spice principles - curcumin and capsaicin suggests that there may not be any significant contribution of stimulation of bile acid biosynthesis to the hypocholesterolemic action of these spices, and the latter action may solely be due to interference with exogenous cholesterol absorption. AA

### Paprika

479

Vinas (P), Cordoba (MH) and Sanchez-Pedreno (C). **Determination of ethoxyquin in paprika by high performance liquid chromatography.** *Food Chemistry* 42(3): 1991: 241-251

A new reverse-phase HPLC method using gradient elution technique, UV detection at 270 nm, fluorimetric detection with excitation at 311 nm, emission at 444 nm and detection limit at 0.2  $\mu$ g/ml is proposed to determine ethoxyquin in commercial samples of paprika used to retard the decomposition of some pigments. SD

## SENSORY EVALUATION

480

Bottiglieri (P), De Sio (F), Fasanaro (G), Mojoli (G), Impembo (M), Castaldo (D). **Rheological characterization of ketchup.** *Journal of Food Quality* 14(6): 1991: 497-512

The ketchup flow behaviour, which is highly subjected to the production technology and the raw materials, cannot be described adequately by the Harper and El Sahrighi equation as well as the equation that links the apparent viscosity of ketchup to the serum viscosity. SD

## FOOD STORAGE

Nil

481

Srinivasan (K), Mahadevappa (KL) and Radhakrishnamurthy (R). **Toxicity of  $\beta$ - and  $\gamma$ -hexachlorocyclohexane in rats of different ages.** *Bulletin of Environmental Contamination and Toxicology* 47(4): 1991: 623-627

Male Wistar rats of 5 different age groups (5, 10, 16, 32 wks and 16 months) were fed with diets containing 80 mg%  $\beta$ -HCH or  $\gamma$ -HCH and 21% casein, 10% cane sugar, 10% peanut oil, 1% vitamin mix, 2% salt mix and 56% corn starch. Results showed that the body wt. of rats of any age group were not affected by HCH treatments. The liver wt. were increased more in younger rats as compared to aged rats. The increase in liver wts. caused by  $\beta$ -HCH over the corresponding controls was 99, 67, 44, 41 and 24% respectively and liver wts. caused by  $\gamma$ -HCH over the corresponding controls was 40, 40, 31, 18 and 13% respectively. Significant increase in kidney wts were seen only in 5 and 10 wks age rats, and HCH isomer had no effect on rats of higher age group. SRA

## BIOCHEMISTRY AND NUTRITION

482

Kaur (S) and Kawatra (BL). **Effect of quality of protein and levels of vitamin A on protein metabolism in rats.** *Indian Journal of Nutrition and Dietetics* 28(3): 1991: 82-89

Wheat and Bengal gram flours were mixed in 70:30 proportion and chapathies (unleavened bread) were made and dried in an oven at 50 - 70°C overnight and ground to a fine powder. The diets were fed for 4 wks to albino rats (Wistar strains) as such at 10% protein level or after supplementing with 5% milk powder. The % protein, fibre, ether extract, minerals and vitamins in the diets were maintained constant but vitamin A content was either deficient or normal (2000 IU vitamin A/100 g diet) or high (25,000 IU/100 g diet). Deficiency of vitamin A in wheat plus Bengal gram flour chapathi diet fed group showed decrease in gain in body wt. PER, protein digestibility and decrease in vitamin A stores, liver nitrogen, urea and ammonical nitrogen in plasma and increased urinary nitrogen excretion than the normal vitamin A level diet fed group. The high vitamin A level diet fed rats produced significantly more faecal N and lower protein digestibility than the normal vitamin A level diet fed rats. GS

483

Gerster (H). **Potential role of  $\beta$ -carotene in the prevention of cardiovascular disease.** *International Journal for Vitamin and Nutrition Research* 61(4): 1991: 277-291

Patients with stable angina pectoris who took 50 mg  $\beta$ -carotene every other day for more than 2 yr. experienced only half as many cardiovascular events as those taking place. This may be ascribed to the antioxidant effect of  $\beta$ -carotene or to an increase in plasma high-density lipoprotein known to reduce cardiovascular disease risk. 82 references. GS

484

Wang (TS), Chang (WH) and Chiang (BH). **The manufacture of cysteine using an electrochemical membrane reactor.** *Journal of Food Engineering* 15(3): 1991: 209-219

Conversion of cystine to cysteine was carried out in a batch recirculation type electrochemical membrane reactor. The reactor was constructed with a lead plate as cathode, and platinum as anode. The catholyte was cystine in HCl sol., and the anolyte was 0.1 N H<sub>2</sub>SO<sub>4</sub> sol. The catholyte and anolyte were separated by a cation exchange membrane. When the electrode distance was 0.65 cm, catholyte concn. was 0.4 M cystine, the process was operated at 30°C, 200 ml/min of flow rate and 20 mA/cm<sup>2</sup> of current density, a current efficiency of 91.5% could be achieved. After electrochemical reaction was completed, the cysteine crystal was obtained by further concn. and crystallization. The overall recovery of cysteine crystal reached 91%. AA

485

Johnson (MA), Fischer (JG) and Kays (SE). **Is copper an antioxidant nutrient ?.** *CRC Critical Reviews In Food Science and Nutrition* 32(1): 1992: 1-31

This review identified biochemical and clinical roles of Cu as an antioxidant. Cu as biological antioxidant, practical implications in health and disease and recommendations for research are the aspects covered in this article. 252 references. SRA

486

Hemila (H). **Vitamin C and plasma cholesterol.** *CRC Critical Reviews In Food Science and Nutrition* 32(1): 1992: 33-57

Reports of animal studies show that vitamin C participates in cholesterol metabolism, and the most significant effect of the vitamin appears to be on the catabolism of cholesterol. Several intervention studies suggest that vitamin C may also have a substantial role in human cholesterol metabolism. Aspects reviewed in this article are: cholesterol



metabolism (guinea pigs, rabbits and pigs, effect of cholesterol on vitamin C metabolism, lipoproteins and lipid oxidation), triglyceride metabolism, physiological studies in man and primates (acute scurvy, supplementation and depletion in man), intervention studies (pretreatment cholesterol level, other factors possibly affecting the results, HDL-cholesterol and triglycerides), epidemiological studies (cholesterol, HDL-cholesterol and triglycerides, mortality and morbidity), and conclusions (nutritional recommendations, prevalence of low vitamin C levels). 279 references. SRA

487

Bradbury (JH). **Properties and analysis of antinutritional factors in foods.** *ASEAN Food Journal* 6(4); 1991; 123-128

Five most important antinutritional factors (enzyme inhibitors, cyanogenic glucosides, lectins, glucosinolates and saponins) are discussed in this review. 40 references. SRA

488

Craven (GS) and Reardon (K). **Analysis of trace minerals in foods.** *ASEAN Food Journal* 6(4); 1991; 129-140

Trace minerals (nutritional and toxicological factors), analytical methodologies (sampling, destruction of organic matter, detection techniques for trace minerals), detailed methodological aspects, analytical quality assurance, review of other methods and techniques, lab. trace mineral results summary (Cu in crustacea, Se in crustacea, As in marine plant material, Hg in shark, Cu and Se in nuts) are covered in this review. 42 references. SRA

489

Dausch (JG). **The problem of obesity: Fundamental concepts of energy metabolism gone awry.** *CRC Critical Reviews In Food Science and Nutrition* 31(4); 1992; 271-298

Review. 70 references. SRA

490

Rumney (CJ) and Rowland (IR). **In vivo and in vitro models of the human colonic flora.** *CRC Critical Reviews In Food Science and Nutrition* 31(4); 1992; 299-331

The advantages and disadvantages of various *in vitro* systems for studying gut microflora and its metabolic activity (from simple static cultures to the more sophisticated continuous and semicontinuous flow models) are reviewed. The apparatus involved

is described with practical information on media, running conditions and sampling. The bacteriological and metabolic criteria for establishing the similarity of the models to the *in situ* colonic flora are also discussed. The major applications (current and future) of the models, including fermentation studies on the dietary fiber, metabolism of nutrients and foreign compounds (including carcinogens) in food, and the investigation of colonization resistance are reviewed. Interms of *in vivo* models, the application of conventional lab. animals to toxicity of chemicals and gastrointestinal infections are also discussed in this review. 116 references. SRA

491

Carpenter (CE) and Mahoney (AW). **Contributions of heme and nonheme iron to human nutrition.** *CRC Critical Reviews In Food Science and Nutrition* 31(4); 1992; 333-367

This review evaluates the contributions of both heme and nonheme Fe in establishing and maintaining a healthful Fe status. The human requirement of Fe, bioavailability of heme and nonheme Fe, amounts of heme and nonheme Fe in the diet are individually estimated after reviewing relevant literature. 238 references. SRA

492

Metcalf (DD). **The nature and mechanisms of food allergies and related diseases.** *Food Technology* 46(5); 1992; 136-139

The term food allergy and its classification into immunoglobulin-E-mediated disease, immune-complex reactions and delayed-hypersensitivity-induced diseases are explained in this article. Aspects covered are the differential diagnosis which include enzyme deficiencies, gastrointestinal disease, anatomical defects, reaction to additives, toxins and contaminants, collagen vascular diseases, endocrine disorders and psychological factors; controversial diagnoses and tests and proper classification of food-related diseases. CSA

493

Sampson (HA). **Food hypersensitivity: Manifestations, diagnosis and natural history.** *Food Technology* 46(5); 1992; 141-144

Aspects dealt in this article are the pathogenesis of food hypersensitivity: various clinical manifestations of food hypersensitivity such as food-induced gastrointestinal hypersensitivity, food-induced respiratory hypersensitivity, food-induced cutaneous hypersensitivity, food-induced generalised anaphylaxis and other



food-induced symptoms; diagnosing food allergy; treatment of food hypersensitivity; natural history of food hypersensitivity and the importance of ingredient labeling. CSA

494

Taylor (SL). **Chemistry and detection of food allergens.** *Food Technology* 46(5); 1992: 146, 148-152

Highlights the progress made in the characterization and identification of food allergens in milk, eggs, legumes, seafood, grains, fruits and vegetables and the immunoassays to test the presence of allergens in foods. CSA

495

Samah (OA), Putih (MF) and Selamat (J). **Biochemical changes during fermentation of cocoa beans inoculated with *Saccharomyces cerevisiae* (Wild strain).** *Journal of Food Science and Technology (India)* 29(6); 1992: 341-343

The overall pH profile of the cotyledon in the inoculated beans during fermentation was slightly higher than the control beans. The % of glucose remaining in the pulp of both the inoculated and control beans at the end of fermentation were 20% and 3% respectively. Ethanol and acetic acid production are generally higher in the inoculated beans as compared to the control beans. The intensity of chocolate flavour obtained from the inoculated and control beans was almost the same. However, in the inoculated beans, bitterness was reduced by 28%. AA

## TOXICOLOGY

496

Scheuplein (RJ). **Perspectives on toxicological risk - an example: Foodborne carcinogenic risk.** *CRC Critical Reviews in Food Science and Nutrition* 32(2); 1992: 105-121

This review article indicates that both epidemiological data and the simplest kind of risk assessment agree that foodborne carcinogenic risk probably overwhelmingly originates from the food itself and not from additives, pesticides or contaminants. Aspects covered include: attribution of cancer risks (direct food additives, GRAS substances, pesticides and contaminants, naturally occurring carcinogens, carcinogens in traditional food and spices and flavours), food preparation and mycotoxins. 64 references. SRA

497

Meijer (GW), Janssen (GB), Beynen (AC) and Speijers (GJA). **Is dietary ergotamine atherogenic in the rabbit?** *Food and Chemical Toxicology* 30(8); 1992: 731-734

The effect of dietary ergotamine on pre-lesional indicators of atherosclerosis was studied in rabbits. The experimental purified diets contained 0.08% (w/w) cholesterol and either 0, 40 or 200 mg ergotamine-tartrate/kg. After 6-wk, serum total cholesterol concn. and the ratio of serum total cholesterol:high-density lipoprotein-cholesterol were significantly increased by ergotamine in a dose-dependent manner. Dietary ergotamine raised the total level of glycosaminoglycans and the relative proportion of chondroitin sulphate in the abdominal aorta. It is suggested that dietary ergotamine is atherogenic in the rabbit. AA

## FOOD LAWS AND REGULATIONS

498

Thompson (MS). **Issues associated with the use and regulation of fat substitutes.** *CRC Critical Reviews in Food Science and Nutrition* 32(2); 1992: 123-126

499

Borzelleca (JF). **The safety evaluation of macronutrient substitutes.** *CRC Critical Reviews in Food Science and Nutrition* 32(2); 1992: 127-139

Guidelines for the safety evaluation of macronutrient substitutes described in this article recognizes the uniqueness of these materials and the limitations of current methods of these materials and the limitations of current methods and proposes the utilization of animal and human data, consideration of nutritional and toxicological effects, special attention to kinetic and dispositional data, the use of nontraditional safety/uncertainty factors and the use of post-marketing surveillance. 12 references. SRA

500

Rodricks (JV), Starr (TB) and Taylor (MR). **Evaluating the safety of carcinogens in food. Current practices and emerging developments.** *Food Drug Cosmetic Law Journal* 46(5); 1991: 513-552

This article reviews the origin and application of the one-in-one million benchmark for "negligible risk" or "safety" judgements about carcinogens, and examines the basis for the agencies' confidence that assessed the lifetime risk at or below the level satisfy a protective food safety standard. The review



concludes with the recent developments in risk assessment such as use of pharmacokinetic and human data, new understanding and application of information on the mechanisms of carcinogenesis

and more accurate evaluations of human exposures to dietary substances. SD





# AUTHOR INDEX

- Achoba (II)  
321
- Acuff (GR)  
433
- Adewusi (SRA)  
348
- Adhikari (AK)  
408
- Afolabi (OA)  
347 348
- Agarwal (TN)  
388
- Agbaji (AS)  
321
- Agbaji (EB)  
321
- Ahmed (M)  
293
- Ajisegiri (ES)  
298
- Akinyemiju (AO)  
348
- Albel Singh  
352
- Allen (G)  
456
- Alli (I)  
330
- Ambedkar (RK)  
418
- Andrews (WH)  
456
- Anjaneyulu (ASR)  
449 453
- Arora (KL)  
421
- Arteaga (GE)  
455
- Arul (J)  
343
- Ashenafi (M)  
286
- Asna Urooj  
477
- Azcona (JI)  
412
- Backyavathy (DM)  
342
- Badau (MH)  
298
- Bakhshi (AK)  
389
- Bakr (AA)  
326
- Balasubramaniam (KA)  
345
- Banks (JM)  
406
- Barbut (S)  
432
- Barres (C)  
273
- Barrett (DM)  
357 358
- Batey (IL)  
312
- Bau (HM)  
339
- Beaver (RW)  
318
- Beltran (A)  
461
- Bergholz (CM)  
473
- Berry (SK)  
332
- Bertola (NC)  
413
- Betschart (AA)  
299
- Bevilacqua (AE)  
413
- Beynen (AC)  
497
- Bhakare (HA)  
331
- Bhelande (HU)  
258
- Bhojaraj (SK)  
376
- Bhupal Reddy (T)  
345
- Biale (TB)  
319
- Biemer (P)  
463
- Bigelow (SW)  
284
- Biliaderis (CG)  
311 368
- Bittenbender (HC)  
325
- Blackbourne (HR)  
356
- Bock (MA)  
463
- Borzelleca (JF)  
499
- Boskou (D)  
475
- Bottiglieri (P)  
480
- Bouchikhi (B)  
275
- Boulet (M)  
343
- Bouman (S)  
403
- Bourges (H)  
463
- Bradbury (JH)  
487
- Brar (P)  
386
- Buckley (DJ)  
440
- Budras (K-D)  
451
- Bushuk (W)  
311
- Busse (M)  
286
- Busta (FF)  
252
- Cacace (D)  
276
- Calkins (CR)  
446
- Campbell (S)  
266
- Carpenter (CE)  
491
- Castaldo (D)  
480
- Cavalieri (R)  
362
- Chakraborty (MK)  
279
- Chalapathi (K)  
379
- Champange (ET)  
303
- Chandramauli (R)  
378
- Chandrashekar (A)  
322
- Chang (WH)  
484

Charkrabarti (J)  
 365  
 Chavan (SM)  
 385  
 Chedid (LL)  
 370  
 Cheema (AS)  
 421  
 Chen (TC)  
 452  
 Chiang (BH)  
 484  
 Chiu (MM)  
 299  
 Chopade (SS)  
 418  
 Cleland (AC)  
 269 270 271  
 Cleland (DJ)  
 269 270 271  
 Conte (J)  
 353  
 Cooley (HJ)  
 467  
 Cordoba (MH)  
 479  
 Cox (C)  
 372  
 Cox (TS)  
 304  
 Coxon (DT)  
 278  
 Craven (GS)  
 488  
 Curran (SP)  
 313 314  
 Dahl (SR)  
 340  
 Dalglish (DG)  
 426  
 Dani (NP)  
 454  
 Das (HK)  
 337  
 Das (YG)  
 380  
 Dausch (JG)  
 489  
 de Cindio (B)  
 276  
 De Jong (P)  
 403  
 De Sio (F)  
 480  
 Debry (G)

275  
 Deepa (CR)  
 477  
 Del Valle (FR)  
 463  
 Deniston (MF)  
 351  
 Deosthale (YG)  
 280  
 Desai (N)  
 341  
 Deseo (MA)  
 285  
 Dexter (JE)  
 305  
 Dhandapani (M)  
 472  
 Dickinson (E)  
 293 426  
 Donelson (JR)  
 399  
 Dong (H)  
 304  
 Dorsey-Redding (C)  
 319  
 Drake (SR)  
 362  
 Dransfield (E)  
 435 436 437  
 Driscoll (RH)  
 260  
 Dronzek (BL)  
 309  
 Drumm (BM)  
 430  
 Dwarakanath (CT)  
 302  
 Eckhoff (SR)  
 320  
 El Blidi (A)  
 353  
 El Ghaouth (A)  
 343  
 Elegbede (JA)  
 321  
 Eliasson (A-C)  
 401  
 Ellerbroek (LI)  
 450  
 Elliott (PH)  
 287  
 Escobedo (M)  
 463  
 Esin (A)  
 264

Essen-Gustavsson (B)  
 443  
 Esuoso (KO)  
 317  
 Etherington (DJ)  
 436  
 Evancho (GM)  
 287  
 Fasanaro (G)  
 480  
 Faubion (JM)  
 313 314  
 Faughnan (KT)  
 462  
 Filer (LJ)  
 284  
 Findlay (CJ)  
 432  
 Finney (PL)  
 398 399  
 Fischer (JG)  
 485  
 Fourie (PC)  
 354  
 Fox (SR)  
 319  
 Fujinuma (K)  
 465  
 Gaines (CG)  
 398  
 Gaines (CS)  
 306 399  
 Gandhi (AP)  
 336  
 Garcia (T)  
 412  
 Gavande (CN)  
 376  
 Gavrilidou (V)  
 475  
 Gawish (RA)  
 326  
 Gerster (H)  
 483  
 Ghoshdastidar (N)  
 365  
 Godshall (MA)  
 371  
 Goedeken (DL)  
 261  
 Gokalp (HY)  
 448 471  
 Gomez (MH)  
 369



Gonzalez (JM)	294	Janardhanan (K)
341	Ho (YS)	323 327
Gopalaswamy (A)	458	Janitha (PK)
301	Hong (C)	297
Gordon (MH)	444	Janssen (GB)
474	Hoover (R)	497
Gowramma (RV)	366	Jayas (DS)
256	Hoseney (RC)	309
Graham (D)	304 307 313 314 315	Jin Gao
359	Hossain (MM)	346
Graham (DM)	269 270 271	Jogand (SB)
284	Hramatsu (K)	418
Graham (WM)	277	Joglekar (HA)
282	Hron (RJSr)	469
Grant (IR)	303	Johnson (A)
438 439	Huebner (FR)	409
Grasso (G)	306	Johnson (LA)
276	Hunt (JA)	319
Gray (JI)	426	Johnson (MA)
440	Hunter (EA)	485
Griffith (RE)	405	Joseph (RL)
474	Hurburgh (CRJr)	430
Griffiths (MW)	319	Josephine (RM)
406	Ibe (A)	327
Grufferty (MB)	465	Joshi (KC)
404	Iida (H)	336
Gupta (RB)	277	Joshi (SV)
312	Ilangantileke (SG)	416
Gupta (S)	469	Kamble (RM)
388	Imamkhasani (S)	316
Gupta (SK)	466	Kamimura (M)
411	Impembo (M)	464
Gurugovind (J)	480	Kaneda (H)
383	Indrani (D)	464
Haikara (A)	394 395	Kano (Y)
289	Intong (CL)	464
Hamer (RJ)	260	Kantasubrata (J)
308	Izydorczyk (MS)	466
Hand (LW)	311	Kapur (P)
446	Jackson (LS)	374
Handoo (SK)	402	Karel (M)
388	Jackson (TC)	250
Hansen (PMT)	433	Karlstrom (K)
338	Jadhav (SJ)	443
Hansmann (CF)	385	Karwe (MV)
354	Jagannatha Rao (R)	262
Heath (JL)	454	Kassuba (A)
428	Jagannatham (A)	398 399
Hemila (H)	333	Katsaras (K)
486	Jagerstad (M)	451
Hernandez (PE)	431	Kaur (S)
412	Jain (MK)	482
Hess (CE)	419	Kawakishi (S)
290	James (MA)	400
Hinton (DM)	318	

Kawaskishi (S)  
 464  
 Kawatra (BL)  
 482  
 Kaya (M)  
 448  
 Kays (SE)  
 485  
 Kermasha (S)  
 330  
 Kesava Rao (V)  
 434  
 Keshava (N)  
 302  
 Khabade (VS)  
 454  
 Khalyfa (A)  
 330  
 Khan (TNI)  
 316  
 Khotpal (RR)  
 331  
 Kikuchi (Y)  
 465  
 Kim (CS)  
 373 397  
 Kimball (RN)  
 351  
 Kinsella (JE)  
 334  
 Kirby (C)  
 268  
 Kirby (CJ)  
 278  
 Kirleis (AW)  
 322  
 Kitatsuji (E)  
 390  
 Knorr (D)  
 253  
 Knuckles (BE)  
 299  
 Kochar (G)  
 344  
 Kokini (JL)  
 370  
 Kometani (T)  
 390  
 Kondaiah (N)  
 449 453  
 Kovalev (YI)  
 445 447  
 Kowale (BN)  
 434  
 Krishna Murthy (MN)

470  
 Kronlof (J)  
 289  
 Kulkarni (AS)  
 331  
 Kulkarni (MB)  
 417  
 Kulkarni (SD)  
 392  
 Kumar (RS)  
 344  
 Kupferman (EM)  
 362  
 Lahiri (A)  
 259  
 Lai (L-S)  
 370  
 Lal (C)  
 382  
 Laser Reutersward (A)  
 431  
 Latha (R)  
 454  
 Law (BA)  
 278  
 LeBlanc (EL)  
 460  
 LeBlanc (RJ)  
 460  
 Ledward (DA)  
 429  
 Lee (B)  
 330  
 Lee (C)  
 358  
 Lee (CY)  
 357  
 Lee (K)  
 402  
 Lehrer (SB)  
 251  
 Lembhe (AP)  
 418  
 Lentz (RR)  
 261  
 Lewis (MJ)  
 409  
 Limons (A)  
 406  
 Lin (CS)  
 295  
 Lin (J-K)  
 458  
 Lin (TY)  
 318

Lin (WDA)  
 307  
 Lindahl (L)  
 401  
 Lindamood (JB)  
 341  
 Lindner (P)  
 334  
 Lindsay (JA)  
 252  
 Liu (FW)  
 357  
 Logomarsino (JV)  
 346  
 Lonkar (MY)  
 376  
 Lookhart (GL)  
 304  
 Lui (FW)  
 358  
 Lukow (OM)  
 311  
 Lundstrom (K)  
 443  
 Lynch (PB)  
 440  
 MacRitchie (F)  
 312  
 Madamba (LSP)  
 285  
 Mahadevappa (KL)  
 481  
 Mahadeviah (M)  
 256  
 Mahendrakar (NS)  
 454  
 Mahesh (DL)  
 280  
 Mahoney (AW)  
 491  
 Mahoney (RR)  
 427  
 Main (GL)  
 364  
 Majgoakar (SV)  
 416  
 Malcata (FX)  
 272  
 Malouf (RB)  
 307 315  
 Mandigo (RW)  
 446  
 Mani (K)  
 401



Manjrekar (SP)	440	Ohashi (S)
302	Mouecoucou (J)	277
Manorama (R)	339	Okada (T)
476	Muir (DD)	283
Maquieira (A)	405	Oke (OL)
377	Mulvihill (DM)	347 348
Martin (R)	404	Okogun (JI)
412	Murthy (TRK)	317
Matsuno (R)	434	Okonkwo (TM)
390	Nagaraja (KV)	429
Mavelle (T)	470	Okos (MR)
275	Nagi (HPS)	263
McIntyre (I)	393	Oles (PJ)
406	Nakai (S)	282
McKenna (BM)	455	Ologunde (MO)
430	Nakazato (M)	347 348
Medley (TL)	465	Osawa (T)
291	Nandakumar (NV)	464
Medlicott (AP)	342	Pal (MA)
356	Nanu (E)	407
Mehta (RN)	441	Panda (B)
386	Narasimhan (G)	453
Meijer (GW)	263	Pandya (AJ)
497	Narasinga Rao (BS)	414
Mejean (L)	280	Papadopoulou-Mourkidou (E)
339	Narayan (KG)	355
Mertens (B)	441	Paramasivam (P)
253	Naresh (R)	301
Metcalfe (DD)	256	Parinyasiri (T)
492	Narpinder Singh	452
Migo (VP)	324	Parkinson (KS)
285	Nas (S)	351
Mills (JT)	471	Parkman (ID)
309	Neerja (A)	435
Mir Salahuddin	336	Patel (AA)
449 453	Nicolas (JP)	411
Miri (A)	339	Patel (HG)
442	Nirmala Devi	414
Mistry (AH)	302	Patel (KV)
320	Nishibori (S)	279
Miyani (RV)	400	Patil (GR)
420	Nishima (T)	411
Mohamed Ali (LH)	465	Patterson (MF)
428	O'Neil (CE)	438 439
Mojoli (G)	251	Peleg (M)
480	Oates (CG)	267 391
Monahan (FJ)	328	Peris-Tortajada (M)
440	Obanu (ZA)	377
Monin (G)	429	Perumal (R)
442	Ochi (T)	301
Moral (A)	277	Polesello (A)
461	Ockerman (HW)	361
Morris (JR)	448	Ponnampalam (R)
364	Oderinde (RA)	343
Morrissey (PA)	317	

Prabhakar (E)	353	Satchell (FB)
342	Rigby (N)	456
Prajapathi (PS)	278	Satyabodha (JA)
411	Rizzolo (A)	470
Prajapati (PS)	361	Satyan (S)
420	Rodricks (JV)	359
Puchades (R)	500	Savell (JW)
377	Rodriguez (AC)	433
Putih (MF)	252	Saxena (AK)
495	Rodriguez (E)	389
Radhakrishnamurthy (R)	412	Scheuplein (RJ)
481	Rogov (IA)	496
Rahman (MS)	445 447	Schiffmann (D)
265	Rom (DL)	296
Raina (P)	322	Schlatter (J)
386	Rowland (IR)	296
Raj Kumar	490	Schreuder (C)
386	Ruba (ABJr)	308
Rajalakshmi (S)	469	Schwertz (A)
470	Rukmini (C)	339
Rajaram (N)	476	Scott (KJ)
323	Rumney (CJ)	359
Rajorhia (GS)	490	Sears (RG)
422	Russell (LF)	304
Raju (KS)	281	Sehgal (RC)
360	Sachdeva (S)	332
Ramadevi (M)	415	Sekhon (KS)
387	Sahin (Y)	324 393
Ramalingam (M)	471	Selamat (J)
384	Saito (K)	495
Ramaswamy (HS)	465	Semple (AJ)
266	Sakai (N)	356
Ranganadham (M)	335	Senthil (A)
422	Sakaue (K)	459
Rao (MA)	277	Seow (CC)
467	Samah (OA)	468
Rao (PV)	495	Shahidi (F)
329	Sambaiah (K)	297 444
Rastogi (S)	478	Shanmugan (G)
386	Sampson (HA)	468
Rasyid (F)	493	Sharada Prasad
338	Sanchez-Marroquin (A)	254
Ravichandran (R)	463	Sharma (DP)
472	Sanchez-Pedreno (C)	375
Reardon (K)	479	Sharma (N)
488	Sanjeev Batheja	434
Reddy (SG)	352	Sharma (S)
333	Sankaran (R)	393
Reddy (SM)	257	Sharp (TR)
288	Santosa (BAS)	433
Reed (RJ)	329	Shashikala Puttaraj
452	Sanyal (MK)	477
Renou (JP)	407	Shelke (K)
442	Sanz (B)	313 314
Rigal (L)	412	



Shepard (RL)	459	Taylor (MR)
347 348	Srinivasa (P)	500
Shilton (NC)	333	Taylor (SL)
409	Srinivasan (K)	494
Shingwekar (PB)	478 481	Teixeira (AA)
331	Srinivasan (S)	252
Shiv Ram	383	Tewari (BD)
410	Stanely (DW)	415
Shobhana Bhide	292	Thakar (PN)
349	Starr (TB)	420
Shogren (MD)	500	Thompson (AJ)
304	Steeneken (PAM)	356
Shull (JM)	367	Thompson (AK)
322	Steffen (G)	356
Shyama Gopal	450	Thompson (MS)
324	Stephenson (P)	498
Sindhu (JS)	456	Tokaev (ES)
410	Stevenson (MH)	445 447
Singh (B)	274	Tokeev (AA)
344	Stoforos (NG)	445
Singh (M)	351	Tolstoguzov (VB)
381	Stringfellow (AC)	447
Singh (RP)	310	Tong (CH)
453	Subramaniam (S)	261 262
Singh (U)	301	Toro (VA)
329	Sukumaran (CT)	416
Singh (V)	457	Torres (L)
386	Sumer (A)	353
Singh (Y)	264	Tragardh (C)
352	Surekha (M)	401
Singhal (OP)	288	Turamabekar (SV)
408	Surve (SS)	417
Sinha (LK)	427	Ukai (S)
336 396	Suryanarayana (V)	277
Sistrunk (WA)	345	Ukhun (ME)
364	Sushma Sawhney	350
Skog (K)	349	Ukpebor (IE)
431	Swarts (DH)	350
Smerage (GH)	363	Ulberth (F)
252	Swyngedau (S)	425
Snehalatha Reddy (N)	391	Upadhyay (KG)
316	Symons (SJ)	414 420
So (RS)	305	Ura (F)
285	Takeuchi (M)	277
Sodi (C)	277	Usha Bajwa
361	Talmon (A)	324
Solms (J)	442	van der Linden (HJLJ)
371	Tan (S)	403
Sopade (PA)	283	Van Lelyveld (LJ)
298	Tatsuno (T)	363
Soundararajan (MS)	283	Van Lonkhuijsen (HJ)
333	Tayeb (J)	308
Speijers (GJA)	273	Vanderslice (JT)
497	Taylor (MAJ)	281
Srikar (LN)	436	

Vanderzant (C)  
433  
Varadaraj (MC)  
302  
Vasanthan (T)  
366  
Vedamuthu (ER)  
423 424  
Venkateswara Rao (G)  
394 395  
Vergnes (B)  
273  
Vidya Sagar Reddy (G)  
459  
Vijaya Khader  
387  
Vijayendran (V)  
384  
Villaume (C)  
339  
Villota (R)  
340  
Vinas (P)  
479

Vinoy Purushottam  
256  
Visser (GJ)  
363  
Wadhwa (BK)  
419  
Wakefield (DK)  
435  
Walker (CE)  
373 397  
Wanasundara (PD)  
297  
Wang (TS)  
484  
Waniska (RD)  
369  
West (IG)  
405  
White (NDG)  
309  
Whittle (CJ)  
278  
Wium (GL)  
354

Woodruff (MA)  
462  
Woortman (AJJ)  
367  
Wu (VY)  
310  
Xiong (X)  
263  
Yackel (WC)  
372  
Yadav (PL)  
407  
Yanar (M)  
448  
Yetim (H)  
448  
Yonekawa (S)  
335  
Yoshii (J)  
255  
Zaritzky (NE)  
413  
Zink (DL)  
287



# SUBJECT INDEX

- Acacia catechu**  
chem. composition/antinutritional factors in *A. catechu* 323
- Acetone**  
*Penicillium aurantiogriseum* penitrem-B production control by acetone 288
- Acidity**  
Cheddar cheese, milk acidity/whey acidity & rennet activity in buffalo milk based 414
- Additives**  
dahi, additives & quality of 418  
estimation dietary exposure assessment method for food additives intake 284  
fruit juices, additives detn. HPLC in 466  
immunotoxic potential evaluation guidelines for food additives 294  
safety evaluation of food additives 295
- Aflatoxins**  
corn, aflatoxin detn. ELISA with LC in 318
- Air**  
tomato concentrate thermal processing in a steritrot, air mixtures effect on 351
- Allergens**  
chemistry/detection of food allergens 494
- Allergy**  
food allergy, nature/mechanisms of 492
- Aluminium**  
foil 258  
food packaging, Al for 257  
processed foods, Al container for 259  
seafoods, Al for packing 457
- Amaranth flour**  
iron bioavailability from fortified grain amaranth flour 347
- Amaranthus**  
*Amaranthus paniculatus* seeds, lectin isolation from 349  
infant formulas, N in *Amaranth* formula containing 463  
seeds, chem. evaluation of West African exotic grain *amaranthus* 348
- Amaranthus caudatus**  
see *Amaranthus*
- Amaranthus hybridus**  
see *Amaranthus*
- Amaranthus hypochondriacus**  
see *Amaranthus*
- Amaranthus paniculatus**  
see *Amaranthus*
- Amines**  
wines, amines detn. LC in 465
- Amino acids**  
galactosidases, amino acids & thermal stabilization of microbial  $\beta$ - 427
- Animals**  
foods, regulations of biotechnologically derived animal, review 291
- Antinutritional factors**  
foods, antinutritional factors properties/analysis in 487  
*Muca pruriens* seed germ plasm, chem. composition/ antinutritional factors in 327  
pulses, antinutritional factors in tree 323
- Antioxidants**  
Cu as antioxidant nutrient 485  
phenolic antioxidants, review 297
- Apples**  
browning/softening in stored Delicious apples 358  
polyphenoloxidase activity in stored Delicious apples 357
- Apricots**  
fruit characteristics/cold storage & quality of dried apricots 354
- Arsenic**  
foods, As in 488
- Ascorbic acid**  
broccoli, salad bar-refrigerated & ascorbic acid retention in 346  
stabilization liposomes microencapsulation of ascorbic acid 278
- Aseptic fillers**  
microbiological evaluation of aseptic fillers 287
- Atherogenicity**  
rabbits, dietary ergotamines atherogenicity in 497
- BHC**  
vegetables, BHC residue detn. HPLC in 342
- Bacillus**  
rice products, *Bacillus* sp. in 302
- Bacillus cereus**  
rice products, *Bacillus cereus* in 302
- Bacteria**  
milk, lactic acid bacteria & psychrotrophic bacterial growth inhibition in raw 406  
thermal process validation, bacterial spores for 252
- Bagasses**  
moisture detn. GC in bagasses 285
- Bakery additives**  
shortening for bakery products 388
- Bakery products**  
ghee residue utilization in bakery products 387  
soybeans in bakery products 392
- Baking**  
wheat flours, mixing time/sponges/ingredients & baking properties of 389
- Bananas**  
bunches, sealed polyethylene tubes & storage of banana 359  
colour change measurement in ripening bananas 356  
puree, glass containers for banana 256
- Barleys**  
milling-dry/sieving &  $\beta$ -glucan enriched fractions of barleys 299
- Batter**  
wheat, batter properties of flour milled from harvested/stored soft 314
- Beef**  
calpain & tenderisation of beef 437  
chilling effect on carcass temp./wt. loss/toughness of beef 430  
enzymatic changes in stored electrically stimulated/non-stimulated beef 436  
muscles, NaCl/tripolyphosphate & thermal properties of beef 432  
patties, carbohydrates & mutagens formation in fried beef 431  
strip lions, volatile compounds identification/evaluation of vacuum/modified atm. packed beef 433  
texture of electrically stimulated/non-stimulated beef 435
- Beer**  
staling chemiluminescence analysis in beer 464

**Bell peppers**  
water loss reduction/quality of  
chitosan coated bell peppers 343

**Bengal gram**  
poshak, preparation of soy/wheat  
based 336

**Benzoic acid**  
fruit juices, benzoic acid detn.  
HPLC in 466

**Beverages**  
closure systems for beverage cans  
254  
volatile N-nitrosamines in French  
beverages 275  
yoghurt drinks, manufacture of 424

**Bioavailability**  
amaranth flour, Fe  
bioavailability from fortified  
grain 347

**Biochemical changes**  
cocoa beans, *Sacch. cerevisiae* &  
biochemical changes during  
fermentation of 495

**Bioreactors**  
yeast bioreactors, contamination  
of immobilized 289

**Biotechnology**  
animal food-biotechnological 290  
plants/animal foods, regulations  
of biotechnologically derived,  
review 291

**Biscuits**  
Al foil for wrapping biscuits 258  
ghee residue utilization in  
ginger/masala biscuits 387

**Bisibele bhath**  
*Bacillus* sp. in bisibele bath 302

**Blackgram**  
papads, soy flour & quality of  
blackgram 477

**Boiling point**  
tangerine juices, boiling point  
rise of conc. Thai 469

**Boxes**  
tomatoes, boxes suitability for  
packing 352

**Brassica napus**  
see Canola

**Bread**  
compressive stress-strain  
relationship of layered assays  
of bread 391  
flat bread production, technology  
of 393  
improvers & quality of whole  
wheat flour bread 394  
ingredients & quality of whole  
wheat bread 395

**Breeding**  
chicken nuggets, breeding flour

protein & yields/breeding  
dispersion of 452

**Breadmaking**  
wheat flour, dough mixers &  
breadmaking quality of 401  
wheat, gliadins & breadmaking  
quality of 308

**Breakfast cereals**  
starch dispersion in breakfast  
cereals 369

**Brinjals**  
fungicide residues in brinjals 345

**Broccoli**  
salad bar-refrigerated & ascorbic  
acid retention in broccoli 346

**Broilers**  
NaCl sol. & *Pectoralis*  
*superficialis* expansion of  
broilers 428  
meat quality, fish/poultry  
visceral silages effect on  
broiler 454

**Brominated vegetable oils**  
soft drinks, brominated vegetable  
oil detn. colorimetry in 470

**Brown rice**  
ethanol & stabilization of brown  
rice 303

**Browning**  
UHT milk, Maillard browning &  
flavour changes of heated 408  
apples, browning in stored  
Delicious 358

**Buffaloes**  
kababs, phosphates & quality of  
buffalo meat 449  
meat, processing/storage & lipids  
of 434

**Butter**  
Al container for butter 259  
spread, cost estimation of butter  
flavoured low-fat 411  
tehina, hydration process in 334

**Butter oil**  
ghee production, butter oil for,  
review 419

**Cabbages**  
glucosinolate contents of  
Himachal Pradesh grown cabbages  
344

**Cajanus cajan**  
see Pigeon peas

**Cakes**  
compressive stress-strain  
relationship of layered arrays  
of cakes 391  
quality of batter type cakes 396  
starches/sugars/emulsifiers  
interactions in high ratio cakes  
397

**Calcium gluconate**  
soy milk, stabilization of Ca  
gluconate 338

**Calpain**  
beef, calpain & tenderisation of  
437

**Can**  
still retort sterilization, can  
arrangement & temp. distribution  
in 264

**Canned foods**  
jackfruit juices, storage temp. &  
stability of canned 468

**Canola**  
*Brassica napus*, lipoxygenase  
isoenzymes  
purification/characterization  
from 330

**Canola oils**  
wheat, storage characteristics of  
canola oil treated 309

**Cans**  
closure systems for processed  
food beverage cans 254

**Capsaicin**  
cholesterol level in rats &  
capsaicin 478

**Carbohydrates**  
beef patties, carbohydrates &  
mutagen formation in fried 431

**Carboxyl**  
vegetables, carboxyl residue  
detn. HPLC in 342

**Carboxymethylcellulose**  
potato plant wastes,  
carboxymethylcellulose & protein  
recovery from 341

**Carcasses**  
beef, chilling effect on carcass  
temp. of 430

**Carcinogens**  
foodborne carcinogenic risk,  
review 496  
foods, carcinogen & safety  
evaluation in 500

**Cardiovascular diseases**  
 $\beta$ -carotenes & prevention of  
cardiovascular diseases 483

**Carotenes**  
cardiovascular diseases,  
 $\beta$ -carotenes & prevention of  
483  
palm oils, processing &  
 $\beta$ -carotene retention in 476

**Carrageenans**  
pH/temp. & thaumatin interaction  
with carrageenans 277  
rats, soy protein diets  
supplemented with carrageenans  
effect on 339



- Caseins**  
galactosidases, casein amino acids & thermal stabilization of microbial  $\beta$ - 427  
iron availability & caseins 402
- Chapathies**  
rats, protein quality/vitamin A level in chapathies fed 482
- Cheddar cheese**  
acidity & rennet activity in buffalo milk Cheddar cheese 414
- Cheese**  
Al containers for cheese 259  
goats milk detection ELISA in cheese 412  
properties/protein breakdown during ripening of 'port salut Argentino' cheese 413
- Chemical properties**  
frankfurters, chem. properties of soy flour containing Turkish style 448  
plantain flour, chemical properties of stored instant 350  
sarsen seed/oils, chemical properties of 332
- Chemiluminescence**  
beer, staling chemiluminescence analysis in 464
- Chemistry**  
allergens, chemistry of food 494
- Chhana**  
coagulants & yield/sensory quality of chhana 416  
spread, processing & quality of chhana 415
- Chickens**  
nuggets, breeding flour protein & yields/breeding dispersion of chicken 452  
patties/kababs, phosphate/spent hen yolk & quality of chickens 453
- Chickpeas**  
Cicer arietinum, cooking/packaging characteristics of 324  
tempeh fermentation, *Lactobacillus plantarum* effect on microbial development during chickpea 286
- Chikki**  
ghee residue utilization in chikki 387
- Chilling**  
beef, chilling effect on carcass temp./wt. loss/toughness of 430
- Chitosans**  
cucumbers/bell peppers, water loss reduction/quality of chitosan coated 343
- Chocolates**  
Al foil for wrapping chocolates 258
- Cholesterol**  
rats, spices effect on cholesterol levels in 478  
vitamin C & cholesterol metabolism, review 486
- Cicer arietinum**  
see Chickpeas
- Citric acid**  
chhana, citric acid & yield/sensory quality of 416  
*Cyperus esculentus*/*Zea mays*, citric acid production from 317
- Classification**  
wheat hardness & air classification of flour 310
- Coagulants**  
chhana, coagulants & yield/sensory quality of 416
- Cocoa beans**  
*Sacch. cerevisiae* & biochemical changes during fermentation of cocoa beans 495
- Cod**  
*Gadus morhua* muscles, proteins hydrophobicity/reactive groups detn. in frozen stored 460
- Coffee**  
Al containers for coffee 259  
Al foil for packing coffee 258  
coffee bean flour, occupational health hazard in 251
- Collagens**  
meat products, collagen content in 447  
meat products, collagens in 445
- Colorimetry**  
soft drinks, brominated vegetable oil detn. colorimetry in 470
- Colour**  
bananas/mangoes, colour change measurement in ripening 356
- Colourants**  
safety evaluation of colourants 295
- Condensing**  
system of condensing 384
- Containers**  
processed foods, Al container for 259
- Contamination**  
yeast bioreactors, contamination of immobilized 289  
yoghurts, fungal contamination of 423
- Cookers**  
extrusion cookers, solid conveying section thermal model of twin-screw 273
- Cookies**  
ghee residue utilization in cookies 387  
hardness instrumental measurement of cookies 398 399  
sugars & quality of baked cookies 400
- Cooking**  
chickpea, cooking/parching characteristics of 324  
cowpeas, cooking & soaking properties of cooked 326  
sorghum flour, cooking & in vitro digestibility of 322
- Cooling**  
system of coling
- Copper**  
antioxidant nutrient as Cu 485  
foods, Cu in 488
- Copra**  
meals, moisture detn. GC in copra 285
- Corn**  
aflatoxins detn. ELISA with LC in corn 318  
debranning-alkali of corn 320  
grain composition/physical properties & wet milling characteristics of corn 319  
Pelegs equation & water absorption during soaking of corn 298  
*Zea mays*, citric production from 317  
*Zea mays*, nutritional quality evaluation of 316
- Corn bran**  
debranning-alkali of corn bran 320
- Corn chips**  
temp. & moisture isotherms of corn chips 321
- Corn products**  
nutritional quality evaluation of corn products 316
- Corn proteins**  
corn/corn products, proteins in 316
- Cost**  
ice creams, cost estimation for filled 421
- Cottonseeds**  
glycolipid composition of cottonseed var. 331
- Cowpeas**  
*Vigna sinensis*, soaking/cooking & properties of cooked cowpeas 326  
*Vigna unguiculata* leaves, handling/storage of 325

- Crustaceans**  
minerals-trace analysis in crustaceans 488
- Crystallization**  
sugar industries, conductivity/viscosity/temp. & sugar crystallization process in 374
- Cucumbers**  
water loss reduction/quality of chitosan coated cucumbers 343
- Cumin**  
cholesterol levels in rats & cumin 478
- Curcumin**  
cholesterol levels in rats & curcumin 478
- Cyperus esculentus**  
citric acid production from *C. esculentus* 317
- Cysteines**  
electrochemical membrane reactor & manufacture of cysteines 484
- DDT**  
vegetables, DDT residue detn. HPLC in 342
- Dahi**  
additives & quality of dahi 418  
particle size distribution of mixed milk dahi 417
- Dairy products**  
iron availability & dairy products 402
- Daminozides**  
protein food products, daminozide detn. modified GC-MS in high 462
- Debranning**  
corn/corn bran, debranning-alkali of 320
- Dehulling**  
*Cajanus cajan* genotypes, dehulling method/physical characteristics & dhal yield of 329
- Demineralisation**  
sugarcane juices, demineralisation electro dialysis system for clear 386
- Denaturation**  
 $\beta$ -lactoglobulins, heat treatment equipment fouling & denaturation of 403
- Dhal**  
*Cajanus cajan* genotypes, dehulling method/physical characteristics & dhal yield of 329
- Diacetyl tartaric acid ester**  
bread, DTAE & quality of whole wheat flour 394
- Diammonium phosphates**  
sesame, diammonium phosphate effect on 333
- Dietary exposure assessment method**  
food additives intake estimation by DEAM 284
- Digestibility**  
sorghum flour, cooking/sodium bisulphite & in vitro digestibility of 322
- Diseases**  
nature/mechanisms of food allergy & related diseases 492
- Dithane**  
brinjals, residues in 345
- Dough**  
wheat flour, dough mixer & rheological properties/breadmaking quality of 401
- Dried foods**  
skim milk, properties optimization of dried 405
- Drying**  
granular products, drying air recirculation of 260  
tray drying of khoa 422
- ELISA**  
corn, aflatoxin detn. ELISA with LC in 318
- Egg yolks**  
chicken patties/kababs, spent hen yolk & quality of 453
- Eggs**  
shell eggs, *Salmonella* recovery from 456
- Electrical stimulation**  
beef, texture of electrically stimulated 435
- Electrodialysis**  
sugarcane juices, demineralisation electro dialysis system for clear 386
- Emulsifiers**  
cakes, starches/sugars/emulsifiers interactions in high ratio 397  
starch, emulsifiers & gelatinization of 373
- Emulsifying properties**  
milk protein isolates, emulsifying properties of 404
- Emulsions**  
oil-in-water emulsions, phosvitin adsorption with milk proteins in 426  
water-in-oil-in-water emulsions for food applications 276
- Encapsulation**  
microencapsulation & controlled delivery of 268
- Endosperm**  
wheat, endosperm tensile strength measurement in 315
- Energy conservation**  
sugar factories, steam economy in 383
- Engineering**  
food technology & engineering 250
- Enterotoxin**  
pork kabab/salami, *Staphylococcal* enterotoxin production ELISA from 441
- Enzymes**  
beef, enzymatic changes in stored electrically stimulated/non-stimulated 436  
foods, enzyme inhibitors in 487
- Equipments**  
condensing/cooling system 384  
filling/weighing system for sugar-automatic 382  
reactors for liquid foods, thermal processing continuously stirred tank 272  
temp. measurement system, design/calibration of 261
- Ergotamines**  
rabbits, dietary ergotamines atherogenicity in 497
- Ethanol**  
brown rice, ethanol & stabilization of 303  
milk, UHT process & ethanol stability of 409
- Ethoxyquin**  
paprika, ethoxyquin HPLC detn. in 479
- Ethylene**  
fruit storage rooms, oxidation reactor-low temp. & ethylene removal in 353  
pears, ethylene & volatile compounds development in stored *Passa crassana* 361
- Evaporators**  
design for evaporator system 381  
falling film evaporators 375  
falling film evaporators 376
- Extruded foods**  
composition/pore structure & binding energy/moisture diffusivity in porous foods 263
- Extrusion**  
twin-screw extrusion cookers, solid conveying section thermal model of 273
- Falling film evaporators**  
375



## **Fats**

- low-fat spread, cost estimation of butter flavoured 411
- pork, dietary fat & lipid oxidation in 440
- starch-based fat-replacers 372
- substitutes, use/regulation of fat, review 498

## **Fats animal**

- sardine fillets, fat content & storage life of smoked 461

## **Fenitrothion**

- vegetables, fenitrothion residue detn. HPLC in 342

## **Fenugreek**

- glucosinolate contents of Himachal Pradesh grown fenugreek 344

## **Fermentation**

- cocoa beans, *Sacch. cerevisiae* & biochemical changes during fermentation of 495
- sausages, sulphonamides residues fermentation effect in 450

## **Fermented foods**

- sausages, microstructure of fermented 451

## **Filling**

- sugar filling system-automatic 382

## **Fish**

- Al container for fish 259
- broiler meat quality, fish based feed effect on 454

## **Flakes**

- corn flakes, nutritional quality evaluation of 316

## **Flavour**

- starch & flavour interactions 371
- toxicology, review 496
- UHT milk, Maillard browning & flavour changes of heated stored 408

## **Flavoured foods**

- spread, cost estimation of butter flavoured low-fat 411

## **Fluorescence**

- wheat flour, refinement pericarp fluorescence imaging estimation of 305

## **Fluorometry**

- foods/biological materials, riboflavin fluorometric detn. in 281

## **Foaming**

- protein + propylene glycol alginate, foaming of 293

## **Foaming properties**

- milk protein isolates, foaming properties of 404

## **Food industries**

- occupational health hazard in food industries 251

## **Food technology**

- science/engineering advances & food technology 250

## **Frankfurters**

- characteristics of soy flour containing Turkish style frankfurters 448

## **Freezing**

- foods, freezing time prediction for 269 270 271

## **Frozen foods**

- strawberries, treatment & quality of frozen 364

## **Fruit juices**

- additives detn. HPLC in fruit juices 466

## **Fruit products**

- glass containers for fruit products 256

## **Fruits**

- Al container for fruits 259
- chem. residues in fruits 355

## **Fungi**

- yoghurts, fungal contamination of 423

## **Fungicides**

- brinjals, fungicide residues in 345

## **Gadus morhua**

- see Cod

## **Galactosidases**

- proteins/amino acids & thermal stabilization of microbial  $\beta$ -galactosidases 427

## **Gas chromatography**

- foods, moisture detn. GC in 285
- protein food products, daminozide detn. modified GC-MS in high 462
- yoghurt volatile compounds, headspace GC estimation of 425

## **Gelatinization**

- starch, sugars/emulsifiers & gelatinization of 373

## **Gelation**

- dahi, gelation & quality of 418

## **Genotoxicity**

- sorbates, genotoxicity studies with 296

## **Ghee**

- bakery products, ghee residue utilization in 387
- butter oil for ghee production, review 419

## **Ginger**

- biscuits, ghee residue utilization in ginger 387
- cholesterol level in rats & ginger 478

## **Glass**

- fruit/vegetable products, glass containers for 256

## **Gliadins**

- wheat kernel, gliadin composition & hardness of 306
- wheat, gliadins & breadmaking quality of 308

## **Glucans**

- barleys/oats, milling-dry/sieving &  $\beta$ -glucan enriched 299

## **Glucosinolates**

- foods, glucosinolates in 487
- vegetables, glucosinolate contents of Himachal Pradesh grown 344

## **Glycerol-monostearate**

- bread, GM & quality of whole wheat flour 394

## **Glycolipids**

- cottonseed var., glycolipid composition of 331

## **Glycosides**

- foods, cyanogenic glycosides in 487

## **Goats milk**

- ewes milk/cheese, goats milk detection ELISA in 412

## **Grape juices**

- cvs/press aid & juice yield of crushed grapes 467

## **Grapes**

- cvs/press aid & juice yield of crushed grapes 467
- marketing grapes in Hyderabad 360

## **Groundnuts**

- daminozide detn. modified GC-MS in high protein peanut products 462

## **Gulab jamun**

- khoa type & quality of gulab jamun 420

## **HPLC**

- fruit juices, additives detn. HPLC in 466
- paprika, ethoxyquin HPLC detn. in 479

## **Handling**

- cowpea leaves, handling of 325

## **Hardness**

- cookies, hardness instrumental measurement of 398 399
- wheat hardness & air classification of flour 310
- wheat kernel, environment/gliadin composition & hardness of 306

## **Hazards**

- occupational health hazard in food industry 251

- Heat**  
goat milk, pH & heat stability of 410
- Heat transfer**  
retort, heat transfer rate  
distribution in single basket  
water cascade 266
- Hepatocarcinogenicity**  
rats, nitrite  
hepatocarcinogenicity in 458
- Hepatotoxicity**  
rats, nitrite hepatotoxicity in 458
- Hexachlorocyclohexane**  
rats, hexachlorocyclohexane toxicity in 481
- Hibiscus esculentus**  
see Okra
- Histidines**  
galactosidases, histidines & thermal stabilization of  
microbial  $\beta$ - 427
- Honeys**  
hydroxy methyl furfural formation  
in stored honeys 365
- Horse beans**  
tempeh fermentation, *L. plantarum*  
effect on microbial development  
during horse bean 286
- Hydration**  
tehina, hydration process in 334
- Hydrophobicity**  
cod muscles, proteins  
hydrophobicity/reactive groups  
detn. in frozen stored 460
- Hydroxy methyl furfural**  
honeys, HMF formation in stored 365
- Hypersensitivity**  
food hypersensitivity 493
- Ice creams**  
cost estimation for filled ice  
creams 421
- Idli**  
*Bacillus* sp. in idli 302
- Infant foods**  
formulas, N in Amaranth/soy-oats  
formula containing infant 463
- Instant foods**  
plantain flour,  
production/properties of instant 350
- Intermediate moisture foods**  
meats, characteristics of  
intermediate moisture smoked 429
- Iodines**  
foodstuffs, iodine detn.  
spectrophotometry in 280
- Iron**  
amaranth flour, Fe  
bioavailability from fortified  
grain 347  
corn, Fe in 316  
dairy products & Fe availability 402  
nutrition, heme/nonheme iron  
pigment contribution to, review 491  
tea, processing method & Fe  
content in 471
- Irradiated foods**  
detection of irradiated foods 274
- Irradiation**  
pork, irradiation & microbial  
safety of minced stored 439  
pork, irradiation & quality of  
cold stored 438
- Isabgol**  
*Plantago ovata* seed, chem.  
composition of 279
- Jackfruit juices**  
*Artocarpus heterophyllus* juices,  
storage temp. & stability of  
canned 468
- Jams**  
Al container for jams 259
- Jellies**  
Al containers for jellies 259
- Kababs**  
(see also Meat products)  
chicken kababs, phosphates/spent  
hen yolk & quality of 453  
pork kababs, *Staphylococcal*  
enterotoxin production from 441
- Ketchup**  
rheological characterization of  
ketchup 480
- Khoa**  
drying-tray of khoa 422  
gulab jamun, khoa type & quality  
of 420
- Knol-Khol**  
glucosinolate content of Himachal  
Pradesh grown knol-khol 344
- Lactic acid bacteria**  
milk, lactic acid bacteria &  
psychrotrophic bacterial growth  
inhibition in raw 406
- Lactic acid**  
chhana, lactic acid &  
yield/sensory quality of 416
- Lactobacillus plantarum**  
bean tempeh fermentation, *L.*  
*plantarum* effect on microbial  
development during 286
- Lactoferrin**  
iron availability & lactoferrin  
402
- Lactoglobulins**  
heat treatment equipment fouling  
& denaturation of  
 $\beta$ -lactoglobulins 403
- Lectins**  
*Amaranthus paniculatus* seeds,  
lectin isolation from 349  
foods, lectins in 487
- Lethality**  
retort, lethality in single  
basket water cascade 266
- Lipases**  
fishes, lipase activities of  
frozen stored 459
- Lipids**  
buffalo meat, processing/storage  
& lipids of 434  
pork, dietary  
fat/ $\alpha$ -tocopherol & lipid  
oxidation in 440  
starch & composition of lipids 366
- Liposomes**  
ascorbic acid, stabilization  
liposomes microencapsulation of  
278
- Lipoxygenases**  
canola, lipoxygenase isoenzymes  
purification/characterization  
from 330
- Liquid chromatography**  
corn, aflatoxin detn. ELISA with  
LC in 318  
wines, amines detn. LC in 465
- Maize**  
see Corn
- Manganese**  
tea, processing method & Mn  
content in 471
- Mango juices**  
glass containers for mango juices  
256
- Mangoes**  
colour change measurement in  
ripening mangoes 356
- Margarines**  
Al containers for margarines 259  
olive oil-tristearin blends chem.  
interesterification for  
margarines 475
- Marketing**  
grapes marketing in Hyderabad 360
- Masala biscuits**  
ghee residue utilization in  
masala biscuits 387
- Mass spectrophotometry**  
protein food products, daminozide  
detn. modified GC-MS in high 462
- Masseccuits**  
production, design/performance of  
continuous pan masseccuits 378
- Meat**  
biotechnological animal foods 290



- buffalo meat, processing/storage & lipids of 434
- Meat products**
- collagen content in meat products 447
- collagen in meat products 445
- kababs, phosphates & quality of buffalo meat 449
- metal ions/heme pigments & autoxidation of heat-processed meat products 444
- Membranes**
- biological membrane deterioration/quality loss in food tissues 292
- Methyl parathion**
- vegetables, methyl parathion residue detn. HPLC in 342
- Methylstyrenes**
- polymers/food simulants,  $\alpha$ -methylstyrene detn. GC/MS in styrene-based 283
- Microbial quality**
- pork, irradiation & microbial quality of cold stored 438
- Microbiology**
- aseptic fillers, microbiological evaluation of 287
- Microencapsulation**
- ascorbic acid, stabilization liposomes microencapsulation of 278
- food ingredients, microencapsulation & controlled delivery of 268
- Microorganisms**
- human colonic flora, review 490
- pork, irradiation/modified atm. packaging & microbial safety of minced stored 439
- Microwave digestion**
- food matrixes, microwave digestion & nutrient detn. in 282
- Milk**
- cow's milk & Fe availability 402
- cow/buffalo/goat milk based chhana, coagulant & yield/sensory quality of 416
- dahi, particle size distribution of mixed milk 417
- ewes milk/cheese, goats milk detection ELISA in 412
- goat milk, pH & salt balance/heat stability of 410
- lactic acid bacteria & psychrotrophic bacterial growth inhibition in raw milk 406
- paneer, physico-chemical/sensory properties of low-fat high heated milk based 407
- UHT process & ethanol stability/fouling of milk 409
- Millet**
- Peleg's equation & water absorption during soaking of millets 298
- Milling**
- barley/oats, dry milling &  $\beta$ -glucan enriched fractions of 299
- corn, grain composition/physical properties & wet milling characteristics of 319
- wheat, batter properties of flour milled from harvested/stored soft 314
- wheat, milling properties of flour milled from harvested/stored soft 313
- Mills**
- sugarcane mills, drives gearless for driving 380
- Mineral oils**
- wheat, storage characteristics of mineral oil treated 309
- Minerals**
- foods, trace mineral analysis in 488
- Mixers**
- wheat flour, dough mixer & rheological properties/breadmaking quality of 401
- Mixograph**
- 2-gram mixograph 300
- Moisture content**
- corn chips, temp. & moisture isotherms of 321
- foods, moisture content & thermal conductivity of 265
- foods, moisture detn. GC in 285
- Molasses**
- moisture detn. GC in molasses 285
- Muca pruriens**
- see Pulses
- Mung bean starch**
- granule stability in mung bean starch 328
- Muscles**
- NaCl sol. & Pectoralis superficialis expansion of broilers 428
- cod muscles, proteins hydrophobicity/reactive groups detn. in frozen stored 460
- pig muscles, post-mortem changes NMR in 442
- pigs, slaughtering & muscle fibre characteristics/metabolic response in 443
- Mustard**
- cholesterol level in rats & mustard 478
- glucosinolate contents of Himachal Pradesh grown mustard 344
- Mutagens**
- beef patties, carbohydrates & mutagen formation in fried 431
- Myosins**
- turkey breast myosins, thermal denaturation of 455
- Naphthalene acetic acid**
- sesame, naphthalene acetic acid effect on 333
- Nitrites**
- rats, nitrite hepatotoxicity/ hepatocarcinogenicity in 458
- Nitrogen**
- infant formulas, N in Amaranth/soy-oats formula containing 463
- Nitrosamines**
- foodstuffs, volatile N-nitrosamines in French 275
- Nuggets**
- see Chickens
- Nutrients**
- Cu as antioxidant nutrient 485
- food matrixes, microwave digestion & nutrient detn. in 282
- rice, ameliorants & nutrients of sodic soil grown 301
- safety evaluation of macronutrient substitutes, review 499
- Nutrition**
- iron heme/nonheme pigment contribution to nutrition, review 491
- Nutritional values**
- corn/corn products, nutritional quality evaluation of 316
- cowpeas, soaking/cooking & nutritional values of 326
- Nuts**
- minerals-trace analysis in nuts 488
- Oats**
- infant formulas, N in soy-oats formula containing 463
- milling-dry/sieving &  $\beta$ -glucan enriched fractions of oats 299
- Obesity**
- problems of obesity, review 489
- Occupational hazard**
- food industry, occupational health hazard in 251

**Oil-in-water emulsions**  
phosvitin adsorption with milk proteins in oil-in-water emulsions 426

**Oils**  
blends, oil identification steryl ester analysis in 474

**Okra**  
*Hibiscus esculentus*, pesticide residue detn. HPLC in 342

**Olestra**  
safety evaluation of olestra-fat like replacement, review 473

**Olive oils**  
margarines, olive oil-tristearin blends chem. interesterification for 475

**Oxidation**  
fruit storage rooms, oxidation reactor-low temp. & ethylene removal in 353  
meat products, metal ions/heme pigments & autoxidation of heat-processed 444  
pork, dietary fat/ $\alpha$ -tocopherol & lipid oxidation in 440

**Packaging**  
beef strip lions, volatile compounds identification/evaluation of vacuum packed 433  
food packaging, Al for 257  
seafoods, Al for packing 457  
tomatoes, boxes suitability for packing 352  
trends in food packaging 255

**Packaging materials**  
glass containers for fruit/vegetable products 256

**Packaging modified atmosphere**  
beef strip lions, volatile compounds identification/evaluation of vacuum/modified atm. packed 433  
pork, irradiation & quality of cold stored 438  
pork, modified atm. packaging & microbial safety of minced stored 439

**Palm oils**  
processing &  $\beta$ -carotene retention in crude palm oils 476

**Pan**  
design/performance of continuous pan massecuite production 378

**Paneer**  
physico-chemical/sensory properties of low-fat high heated milk based paneer 407

**Papads**  
blackgram papads, soy flour & quality of 477

**Paprika**  
ethoxyquin HPLC detn. in paprika 479

**Parching**  
chickpea, parching characteristics of 324

**Parkinsonia aculeata**  
chem. composition/antinutritional factors in *P. aculeata* 323

**Pasteurization**  
sausages, sulphonamides residues pasteurization effect in 450

**Patties**  
chicken patties, phosphate/spent hen yolk & quality of 453

**Peaches**  
fruit characteristics/cold storage & quality of dried peaches 354

**Pears**  
ethylene & volatile compounds development in stored Passa Crassana pears 361  
temp. wax drying/refrigerated storage & quality of D'Anjou pears 362

**Peas**  
processed peas, glass containers for 256  
tempeh fermentation, *L. plantarum* effect on microbial development during pea 286

**Penicillium aurantiogriseum**  
preservatives & penitrem-B production control in *P. aurantiogriseum* 288

**Pentosans**  
wheat flour, pentosans in 1B/1R translocation 311

**Pepper**  
black pepper & cholesterol levels in rats 478

**Peroxidases**  
pineapples, storage temp. & peroxidase activity in Queen pineapples 363

**Pesticides**  
okra, pesticide residue detn. HPLC in 342

**Phenols**  
phenolic antioxidants, review 297

**Phosphates**  
beef muscles, tripolyphosphate & thermal properties of 432  
chicken patties/kababs, phosphates & quality of 453  
kababs, phosphates & quality of

buffalo meat 449

**Phosphorus**  
corn/corn products, P in 316

**Phosvitin**  
emulsions, phosvitin adsorption with milk proteins in oil-in-water 426

**Physical properties**  
corn, physical properties & wet milling characteristics of 319  
cowpeas, soaking/cooking & physical properties of 326  
frankfurters, physical properties of soy flour containing Turkish style 448  
plantain flour, physical properties of stored instant 350  
sarson seed/oils, physical properties of Chinese 332  
sausages, preblending time & physical properties of coarse ground meat 446

**Pickles**  
Al containers for pickles 259

**Pigeon peas**  
*Cajanus cajan* genotypes, dehulling method/physical characteristics & dhal yield of 329

**Pigments**  
meat products, metal ions/heme pigments & autoxidation of heat-processed 444

**Pigs**  
muscles, post-mortem changes NMR in pig 442  
slaughtering & muscle fibre characteristics/metabolic response in pigs 443

**Pineapples**  
storage temp. & peroxidase activity/proteins in Queen pineapples 363

**Plantago ovata**  
see Isabgol

**Plantain flour**  
production/properties of instant plantain flour 350

**Plants**  
foods, regulations of biotechnologically derived plant, review 291

**Polyethylenes**  
banana bunches, sealed polyethylene tubes & storage of 359

**Polymers**  
 $\alpha$ -methylstyrene detn. GC/MS in styrene-based polymers 283  
WLF model use in polymers, review



**Polyoxyethylene sorbitan monopalmitate**

bread, PSMP & quality of whole wheat flour 394

**Polyoxyethylene sorbitan monostearate**

bread, PSMS & quality of whole wheat flour 394

**Polyphenoloxidases**

apples, PPO activity in stored delicious 357

**Popping**

corn, nutritional quality evaluation of popped 316

**Pork**

dietary fat/ $\alpha$ -tocopherol & lipid oxidation in pork 440  
irradiation/modified atm. packaging & microbial safety of minced stored pork 439  
irradiation/packaging & quality of cold stored pork 438  
kabab/salami, *Staphylococcal* enterotoxin production from pork 441

**Porosity**

foods, porosity & thermal conductivity of 265

**Porridges**

starch dispersion in porridges 369

**Poshak**

soy-based poshak, preparation of 336

**Potatoes**

wastes, carboxymethylcellulose & protein recovery from potato plant 341

**Poultry**

broiler meat quality, poultry visceral silages effect on 454

**Preservation**

food preservation, nonthermal process development for 253

**Preserves**

strawberry preserves, treatment & quality of 364

**Processing**

buffalo meat, processing & lipids of 434  
chhana spread, processing & quality of 415  
palm oils, processing &  $\beta$ -carotene retention in crude 476  
tea, processing method & mineral content in 471

**Propionic acid**

*Penicillium aurantiogriseum* penitrem-B production control by

propionic acid 288

**Propylene glycol alginate**

foaming of protein + propylene glycol alginate 293

**Prosopsis chilensis**

chem. composition/antinutritional factors in *P. chilensis* 323

**Proteases**

fishes, protease/lipase activities of frozen stored 459

**Protein foods**

daminozide detn. modified GC-MS in high protein food products 462

**Proteins**

cheese, protein breakdown during ripening of 413  
chicken nuggets, breading flour protein & yields/breading dispersion of 452  
propylene glycol alginate + proteins, foaming of 293  
rats, protein quality & protein metabolites in 482

**Proteins animal**

cod muscles, proteins hydrophobicity/reactive groups detn. in frozen stored 460

**Proteins cereal**

rice, ameliorants & protein of sodic soil grown 301  
wheat flour, protein composition/functional properties of 312  
wheat, protein composition/loaf characteristics in 304  
wheat, starch granule protein & endosperm tensile strength of 307

**Proteins fruits**

pineapples, storage temp. & proteins in Queen 363

**Proteins milk**

caseins & Fe availability 402  
emulsifying/foaming properties of milk protein isolates 404

**Proteins vegetables**

potato plant wastes, carboxy methyl cellulose & protein recovery from 341

**Pulses**

*Muca pruriens* seed germ plasm, chem. composition/antinutritional factors in 327

**Quality**

bread, ingredients & quality of whole wheat 395  
cakes, quality of batter type 396  
chhana spread, processing & quality of 415  
cookies, sugars & quality of

baked 400

cucumbers/bell peppers, quality of chitosan coated 343  
dahi, additives & quality of 418  
food tissues, biological membrane deterioration/quality loss in 292  
gulab jamun, khoa type & quality of 420  
kababs, phosphates & quality of buffalo meat 449  
papads, soy flour & quality of blackgram 477  
pears, temp. wax drying/refrigerated storage & quality of D'Anjou 362  
rice, ameliorants & quality of sodic soil grown 301  
soy proteins, quality of N-propanol denatured 340  
strawberry/preserves, treatment & quality of frozen 364  
yoghurts, quality of 423

**Reactors**

cysteines, electrochemical membrane reactor & manufacture of 484  
liquid foods, thermal processing continuously stirred tank reactors for 272

**Reducing sugars**

neocuproine method for detn. of reducing sugars 377

**Regulations**

fat substitutes, use/regulation of, review 498  
plants/animal foods, regulations for biotechnologically derived, review 291

**Rennets**

Cheddar cheese, acidity & rennet activity in buffalo milk based 414

**Residues**

brinjals, fungicide residues in 345  
fruits/vegetables, chem. residues in 355  
ghee residue utilization in bakery products 387  
sausages, sulphonamides residues pasteurization/fermentation effect in 450  
vegetables, pesticide residue detn. HPLC in 342

**Retorts**

heat transfer rate distribution lethality in single basket water cascade retort 266  
still retort sterilization, can arrangement & temp. distribution

- in 264
- Rheological properties**  
cheese, rheological properties during ripening of 'port salut Argentino' 413  
ketchup, rheological properties of 480  
starch rheological properties, structure effect on 370  
wheat flour, dough mixers & rheological properties of 401
- Ribbon fish**  
protease/lipase activities of frozen stored ribbon fish 459
- Riboflavins**  
foods/biological materials, riboflavin fluorometric detn. in 281
- Rice**  
ameliorants &  
yield/nutrients/quality of sodic soil grown rice 301  
brown rice, ethanol & stabilization of 303  
products, *Bacillus* sp. in rice 302
- Rice bran**  
moisture detn. GC in rice bran 285
- Ripening**  
bananas/mangoes, colour change measurement in ripening 356  
cheese, properties/protein breakdown during ripening of 413
- Roti**  
corn roti, nutritional quality evaluation of 316
- Saccharin**  
fruit juices, saccharin detn. HPLC in 466
- Saccharomyces cerevisiae**  
see Yeasts
- Safety**  
additives, safety evaluation of food 295  
carcinogens safety evaluation in foods 500  
macronutrient substitutes, safety evaluation of, review 499  
olestra-fat like replacement, safety evaluation of, review 473  
pork, irradiation/modified atm. packaging & microbial safety of 439
- Salami**  
pork salami, *Staphylococcal* enterotoxin production from 441
- Salmonella**  
shell eggs, *Salmonella* recovery from 456
- Salt**  
goat milk, pH & salt balance of 410
- Saponins**  
foods, saponins in 487
- Sardina pilchardus**  
see Sardines 461
- Sardines**  
fillets, fat content/storage temp. & storage life of smoked sardine 461  
oil sardines, protease/lipase activities of frozen stored 459
- Sarson**  
*Brassica chinensis* seed/oils, properties of Chinese 332
- Sausages**  
fermented sausages, microstructure of 451  
meat sausages, preblending time & properties of coarse ground 446  
sulphonamides residues  
pasteurization fermentation effect on sausages 450
- Science**  
food technology & science 250
- Seafoods**  
Al for packing seafoods 457
- Selenium**  
foods, Se in 488
- Sensory evaluation**  
plantain flour, sensory evaluation of stored instant 350
- Sensory properties**  
cowpeas, soaking/cooking & sensory properties of 326  
frankfurters, sensory properties of soy flour containing Turkish style 448  
paneer, sensory properties of low-fat high heated milk based 407  
pork, irradiation/packaging & sensory quality of cold stored 438
- Sensory quality**  
chhana, coagulants & sensory quality of 416
- Sesame**  
growth regulators/nutrients effect on sesamum 333  
tehina, hydration process in 334
- Sharks**  
minerals-trace analysis in sharks 488
- Shelf-life**  
yoghurts, shelf-life of 423
- Shortening**  
bakery products, shortening for 388
- Sieving**  
barleys/oats, sieving &  $\beta$ -glucan enriched fractions of 299
- Simulants**  
food simulants,  $\alpha$ -methylstyrene detn. GC/MS in 283
- Skim milk**  
properties optimization of dried skim milk 405
- Slaughtering**  
pigs, slaughtering & muscle fibre characteristics/metabolic response in 443
- Smoked foods**  
intermediate moisture smoked meats, characteristics of 429  
sardine fillets, fat content/storage temp. & storage life of smoked 461
- Snacks**  
Al foil for wrapping snacks 258  
*Bacillus* in Indian snacks 302  
soy snack-crisp/spicy 337  
starch dispersion in snacks 369
- Soaking**  
cereals, Pelegs equation & water absorption during soaking of 298  
cowpeas, soaking & properties of 326
- Sodium alginates**  
dahi, sodium alginate & quality of 418  
rats, soy protein diets supplemented with Na alginate effect on 339
- Sodium bisulphites**  
sorghum flour, sodium bisulphite & in vitro digestibility/microstructure of 322  
sorghum flour, sodium bisulphites & in vitro digestibility/microstructure of 322
- Sodium chloride**  
beef muscles, NaCl & thermal properties of 432  
broiler's Pectoralis superficialis expansion & NaCl sol. 428
- Sodium metabisulphite**  
*Penicillium aurantiogriseum* penitrem-B production control by sodium metabisulphite 288
- Sodium stearoyl-2-lactylate**  
bread, sodium stearoyl-2-lactylate & quality of whole wheat flour 394



- Soft drinks
  - brominated vegetable oil detn. colorimetry in soft drinks 470
- Softening**
  - apples, softening in stored Delicious 358
- Sorbates**
  - genotoxicity/cell transformation studies with sorbates 296
- Sorbic acid**
  - fruit juices, sorbic acid detn. HPLC in 466
- Sorghum**
  - Pelegs equation & water absorption during soaking of sorghum 298
  - starch dispersion in parboiled sorghum 369
- Sorghum flour**
  - cooking/sodium bisulphite & in vitro digestibility/microstructure of sorghum flour 322
- Soy flour**
  - frankfurters, characteristics of soy flour containing Turkish style 448
  - papads, soy flour & quality of blackgram 477
- Soy lecithin**
  - bread, soy lecithin & quality of whole wheat flour 394
- Soy milk**
  - stabilization of Ca gluconate fortified with soy milk 338
- Soy products**
  - poshak, preparation of soy-based 336
  - snacks-soy, crisp/spicy 337
- Soy proteins**
  - quality of N-propanol denatured soy proteins 340
  - rats, soy protein diets supplemented with Na alginate/carrageenan effect on 339
- Soybeans**
  - bakery products, soybeans in 392
  - infant formulas, N in soy-oats formula containing 463
  - shape 3-dimensional image analysis of soybeans 335
  - tempeh fermentation, *L. plantarum* effect on microbial development during soybean 286
- Spices**
  - Al foil for packing spices 258
  - rats, spices effect on cholesterol levels in 478
  - soy snack-spicy 337
- toxicology, review 496
- Stability**
  - goat milk, pH & heat stability of 410
  - jackfruit juices, storage temp. & stability of canned 468
- Stabilization**
  - ascorbic acid stabilization
  - liposomes microencapsulation of 278
  - brown rice, ethanol & stabilization of 303
  - soy milk, stabilization of Ca gluconate fortified with 338
- Staling**
  - beer, staling chemiluminescence analysis in 464
  - sugarcane wt., staling & post-harvest loss in 379
- Staphylococcus**
  - pork kabab/salami, Staphylococcal enterotoxin production from 441
- Starch**
  - sweeteners/flavour interactions & starch 371
- Starch**
  - cakes,
    - starches/sugars/emulsifiers interaction in high ratio 397
  - dahi, gelation & quality of 418
  - dahi, starch & quality of 418
  - dispersion behaviour of starches 369
  - fat replacers, starch-based 372
  - food systems, starch structure/phase transitions in 368
  - lipids, starches & composition of 366
  - pastes, liquid thread length estimation of starch 367
  - rheological properties, starch structure effect on starch 370
  - sugarcane juices/products, starch direct assay method in 385
  - sugars/emulsifiers & gelatinization of starch 373
- Steam**
  - sugar factories, steam economy in 383
  - tomato concentrate thermal processing in a steritort, steam effect on 351
- Sterilization**
  - still retort sterilization, can arrangement & temp. distribution in 264
- Steritort**
  - tomato concentrate thermal processing in a steritort,
    - steam/air mixtures effect on 351
- Steryl esters**
  - blends, oil identification steryl ester analysis in 474
- Storage**
  - beef, enzymatic changes in stored electrically
    - stimulated/non-stimulated 436
  - buffalo meat, storage & lipids of 434
  - honeys, hydroxy methyl furfural formation in stored 365
  - jackfruit juices, storage temp. & stability of canned 468
  - wheat, milling/cake-baking properties of flour milled from harvested/stored soft 313
- Storage cereals**
  - wheat, batter properties of flour milled from harvested/stored soft 314
  - wheat, batter properties of flour soft 314
  - wheat, storage characteristics of canola oil/mineral oil treated 309
- Storage cold**
  - fruits, cold storage & quality of dried 354
  - pears, refrigerated storage & quality of D'Anjou 362
  - pork, irradiation/packaging & quality of cold stored 438
- Storage controlled atmosphere**
  - apples, PPO activity in stored Delicious 357
- Storage controlled atmospheres**
  - pears, ethylene & volatile compounds development in stored Passa crassana 361
- Storage frozen**
  - cod muscles, proteins hydrophobicity/reactive groups detn. in frozen stored 460
  - oil sardine/ribbon fish, protease/lipase activities of frozen stored 459
- Storage fruits**
  - apricots/peaches, cold storage & quality of dried 354
  - banana bunches, sealed polyethylene tubes & storage of 359
  - oxidation reactor-low temp. & ethylene removal in fruit storage rooms 353
  - pineapples, storage temp. & peroxidase activity/proteins in Queen 363

- Storage meat**  
pork, irradiation/modified atm.  
packaging & microbial safety of  
minced stored 439  
sardine fillets, fat  
content/storage temp. & storage  
life of smoked 461
- Storage milk**  
UHT milk, Maillard browning &  
flavour changes of heated 408
- Storage vegetables**  
cowpea leaves, storage of 325  
plantain flour, properties of  
stored 350
- Strawberries**  
frozen strawberries, treatment &  
quality of 364  
preserves, treatment & quality of  
strawberry 364
- Substitutes**  
fat replacers, starch-based 372
- Sugar**  
filling system-automatic for  
sugar 382
- Sugar factories**  
conductivity/viscosity/temp. &  
sugar crystallization process in  
sugar industries 374  
falling film evaporators for  
sugar industries 376  
steam economy in sugar factories  
383 384
- Sugarcane juice products**  
starch direct assay method in  
sugarcane juice products 385
- Sugarcane juices**  
demineralisation electrodialysis  
system for clear juices 386  
starch direct assay method in  
sugarcane juices/products 385
- Sugarcanes**  
mills, drives gearless for  
driving sugarcane 380  
staling & post-harvest loss in  
sugarcane wt. 379
- Sugars**  
cakes,  
starches/sugars/emulsifiers  
interactions in high ratio 397  
cookies, sugars & quality of  
baked 400  
reducing sugars detn. by  
neocuproine method 377  
starch, sugars & gelatinization  
of 373
- Sulphonamides**  
sausages, sulphonamides residues  
pasteurization/fermentation  
effect in 450
- Sweet potatoes**  
peels, moisture detn. GC in sweet  
potato 285
- Sweeteners**  
starch & sweeteners interactions  
371
- Tangerine juices**  
boiling point rise of conc. Thai  
tangerine juices 469
- Tartaric acid**  
chhana, tartaric acid &  
yield/sensory quality of 416
- Tea**  
Al containers for tea 259  
processing method & mineral  
contents in tea 471  
seeds, composition/uses of South  
Indian tea 472
- Technology**  
bread production, technology of  
flat 393
- Tehina**  
hydration process in tehina 334
- Tempeh**  
fermentation, *Lactobacillus*  
*plantarum* effect on microbial  
development during bean tempeh  
286
- Temperature**  
continuous temp. measurement  
system, design/calibration of  
261  
filling material effect on  
thermal conductivity  
probe/measurements 262
- Tenderisation**  
beef, calpain & tenderisation of  
437
- Texture**  
beef, texture of electrically  
stimulated/non-stimulated 435  
sausages, preblending time &  
texture of coarse ground meat 446  
tomatoes, texture of packed 352
- Thaumatococcus**  
carrageenans, pH/temp. &  
thaumatin interaction with 277
- Thawing**  
foods, thawing time prediction  
for 269 270 271
- Thermal conductivity**  
filling material effect on  
thermal conductivity  
probe/measurements 262  
foods, porosity/moisture content  
& thermal conductivity of 265
- Thermal processes**  
bacterial spores for thermal  
process validation 252  
food preservation, nonthermal  
process development for 253
- liquid foods, thermal processing  
continuously stirred tank  
reactors for 272  
tomato concentrate thermal  
processing in steritort,  
steam/air mixtures effect on 351  
turkey breast myosins, thermal  
denaturation of 455
- Thermal properties**  
beef muscles,  
NaCl/tripolyphosphate & thermal  
properties of 432
- Tocopherols**  
pork, tocopherol & lipid  
oxidation in 440
- Tomato concentrates**  
thermal processing in steritort,  
steam/air mixtures effect on  
tomato concentrate 351
- Tomatoes**  
boxes suitability for packing  
tomatoes 352  
pesticide residue detn. HPLC in  
tomatoes 342  
puree, glass containers for  
tomato 256
- Toughness**  
beef, chilling effect on  
toughness of 430
- Toxicity**  
additives, toxicity of food 295  
carcinogens, review 496  
food additives, immunotoxic  
potential evaluation guidelines  
for 294  
rats, hexachlorocyclohexane  
toxicity in 481
- Tray drying**  
see Drying
- Triacontanol**  
sesame, triacontanol effects  
on 333
- Turkeys**  
breast myosin, thermal  
denaturation of turkey 455
- Turnips**  
glucosinolate contents of  
Himachal Pradesh grown turnips  
344
- UHT**  
milk, UHT process & ethanol  
stability/fouling of 409
- UHT milk**  
Maillard browning & flavour  
changes of heated stored UHT  
milk 408
- Uppuma**  
*Bacillus* sp. in uppuma 302
- Vadai**  
*Bacillus* sp. in vadai 302



**Vegetable products**

glass containers for vegetable products 256

**Vegetables**

chem. residues in vegetables 355  
glucosinolate contents of Himachal Pradesh grown vegetables 344  
pesticide residue detn. HPLC in vegetables 342

**Vigna unguiculata**

see Cowpeas

**Viscoelasticity**

cheese, viscoelastic properties during ripening of 'port salut Argentino' 413

**Vitamin A**

rats, vitamin A level & protein metabolites in 482

**Vitamin C**

cholesterol metabolism & vitamin C, review 486

**Volatile compounds**

beef strip lions, volatile compounds  
identification/evaluation of vacuum/modified atm. packed 433  
pears, ethylene & volatile compounds development in stored Passa crassana 361  
yoghurt volatile compounds, headspace GC estimation of 425

**Wastes**

broiler meat quality, poultry visceral silages effect on 454

**Water**

cereals, Pelegs equation & water

absorption during soaking of 298

**Weighing**

sugar weighing system-automatic 382

**Weight**

beef, chilling effect on wt. loss of 430

**Wheat**

endosperm tensile strength measurement in wheat 315  
gliadins & breadmaking quality of wheat 308  
kernel, environment/gliadin composition & hardness of wheat 306  
poshak, preparation of soy/wheat based 336  
protein composition/loaf characteristics in wheat 304  
starch granule protein & endosperm tensile strength of wheat 307  
storage characteristics of canola oil/mineral oil treated wheat 309

**Wheat flour**

batter properties of flour milled from harvested/stored soft wheat 314  
bread, improvers & quality of whole wheat flour 394  
dough mixers & rheological properties/breadmaking quality of wheat flour 401  
hardness of wheat & air classification of flour 310  
milling/cake-baking properties of flour milled from

harvested/stored soft wheat 313  
mixing time/sponges/ingredients & baking properties of wheat flour 389  
pentosans in 1B/1R translocation wheat 311  
protein composition/functional properties of wheat flour 312  
refinement pericarp fluorescence imaging estimation of wheat flour 305

**Whey proteins**

iron availability & whey proteins 402

**Wines**

amines detn. in wines 465

**X-ray**

tea, processing method & mineral content analysis in 471

**Yeast baker's**

baker's yeast mediated bioreduction 390

**Yeasts**

Sacch. cerevisiae & biochemical changes during fermentation of cocoa beans 495  
contamination of immobilized yeast bioreactors 289

**Yoghurts**

quality/shelf-life of yoghurts 423  
varieties of yoghurts 424  
volatile compounds, headspace GC estimation of yoghurts 425

**Zea mays**

see Corn





## GENERAL

501

Ganguly (A). **Trends in technology and their relevance to the international food market.** *Food Science and Technology Today* 5(3): 1991: 139-145

The paper examines the global food business, the main consumer trends and the technological challenges of the 1990s. GS

502

Francis (FJ). **Consumer perception of food safety: The American scene.** *Indian Food Industry* 11(3): 1992: 33-35, 41

This paper examines the public perception of the safety of food additives. Tests conducted for carcinogens and non-carcinogens and the interpretation of the data based on certain examples such as alar (a plant hormone), fish in the Great Lakes and bovine somatotropin (a naturally occurring hormone that stimulates milk production) showed that alar and its breakdown products were not carcinogenic and the fish in Great Lakes created a risk of cancer of one in 10,000 in a lifetime. CSA

503

Srivastav (PP). **Roasted blended foods as speciality foods.** *Indian Food Industry* 11(3): 1992: 42-45

The methods for the preparation of low-cost roasted blended speciality foods by roasting or puffing, improvement of food quality through blending, blended foods based on roasting, methods of roasting and puffing, initial moisture content for roasting and puffing, conditioning, addition of salt, pre-heating, roasting and puffing, traditional devices for roasting and puffing, improved devices for roasting and puffing are the aspects explained. CSA

504

Kaul (PL). **Large potential but lost opportunities.** *Indian Food Packer* 47(3): 1992: 27-33

Production of fruits and vegetables in India, world performance in processing fruits and vegetables, export status of Indian food products and the domestic production potential and the export forecast are discussed. KAR

## FOOD PROCESSING

505

Cheryan (M). **Reverse osmosis in food processing.** *Indian Food Industry* 10(6): 1991: 30-37

Application of reverse osmosis (RO) technology in dairy and fruit juice industries is focussed in this article. Among the dairy industry the use of RO for concn. of milk, reduction of milk transport costs, production of fluid cost in dairy plant operations, production of cheese whey and fermented products by RO milk concentrates are dealt. The use of RO technology in the clarification, concn. and deacidification of apple, orange, tomato and other juices are also covered. CSA

506

Anon. **Application of high pressure to food processing and preservation.** *Indian Food Industry* 10(6): 1991: 39

507

Richardson (P). **Microwave technology - the opportunity for food processors.** *Food Science and Technology Today* 5(3): 1991: 146-148

Microwaves offers the food processors many new tools for improving food product var. and quality. This article presents an overview of application of microwave heating in the food processing industry. GS

508

Camire (ME). **Protein functionality modification by extrusion cooking.** *Journal of the American Oil Chemist's Society* 68(3): 1991: 200-205

This review discusses the effects of extrusion on proteins and protein foods in addition to possible new directions for protein extrusion based upon advances in other areas. Aspects covered include: extrusion process, protein denaturation, functional characteristics, nutritional changes and future developments. 48 references. BV

## FOOD PACKAGING

509

Oki (Y). **Recent development of food packaging materials and the expansion of its application.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 38(1): 1991: 66-71 (Ja)

Review. 8 references. BV

510

Anon. **Ohmic resistance heating.** *Indian Food Industry* 10(6): 1991: 38

511

Anon. **Supercritical gas extraction.** *Indian Food Industry* 10(6): 1991: 40

512

Anon. **Scraped surface heat exchanger (SSHE).** *Indian Food Industry* 10(6): 1991: 41

513

Mckenna (BM). **The role of physical properties in the development of new products and processes.** *Indian Food Industry* 10(6): 1991: 42-46

Aspects covered in this article are the physical properties of foods such as shape, colour and mechanical properties, the problems generated by shape and the solutions suggested based on the example from meat, poultry and fish industries. CSA

514

Maesmans (G), Hendrickx (M), Decordt (S), Fransis (A) and Tobback (P). **Fluid-to-particle heat transfer coefficient determination of heterogeneous foods. A review.** *Journal of Food Processing Preservation* 16(1): 1992: 29-69

The review discusses the importance of the fluid-to-particle convective heat transfer coeff. ( $h_{fp}$ ) in thermal processing heterogeneous foods (brine, sauce). Methods to determine  $h_{fp}$  and problems encountered upon their application is reviewed. It gives an overview of the experimental approaches to quantify this parameter in traditional canning as well as aseptic processing. The wide range of previously determined  $h_{fp}$  suggests the need for developing a reliable method to determine the fluid-to-particle heat transfer coeff. in different processing systems under varied conditions. 81 references. SD

515

Sancho (MF) and Rao (MA). **Residence time distribution in a holding tube.** *Journal of Food Engineering* 15(1): 1992: 1-19

The residence time distribution (RTD) of 2 Newtonian (water and 12% sucrose solution) and 2 non-Newtonian liquids (0.2 and 0.4% guar gum solution), at a min. of 5 different flow rates each, was

terminated in a holding tube consisting of 10 sections with a total length of 33 m. at 25 plus or minus 0.5°C. The response to a pulse of NaCl solution was detected by a conductivity transmitter and recorded. The relative variances of the experimental RTD curves were used to evaluate the dispersion and the tanks-in-series models. In general, vessel dispersion numbers were higher in laminar flow. For water in laminar flow, the number of tanks-in-series ranged between 14 and 20 whereas in turbulent flow the number was between 61 and 103. For the sugar solution the number of tanks-in-series was higher. For the 0.2% gum solution data the number of tanks was estimated to be between 18 and 34, while for the 0.4% gum solution data it was estimated to be between 7 and 12. Neither model can be said to be better than the other. AA

516

de Alwis (AAP) and Fryer (PJ). **Operability of the ohmic heating process: Electrical conductivity effects.** *Journal of Food Engineering* 15(1): 1992: 21-48

Ohmic heating is a novel commercial process in which an electric current is applied to a flowing food stream. The passage of current generates heat, which is used to sterilise the food; it is thus possible to sterilise particles as fast as liquids. The controlling parameter is the electrical conductivity of the solid and liquid phases. The range of conductivities which are acceptable to the ohmic process have been examined by finite element simulation. The variation of electrical conductivity in the components of a feed mix on the operability of the process is considered, together with the ohmic heating patterns of composite materials. Providing the conductivities of the 2 phases do not differ significantly even heating will result. Other process conditions are also briefly discussed. AA

517

Anon. **Some features of the parameter  $k$  of the GAB equation as applied to sorption isotherms of selected food materials.** *Journal of Food Engineering* 15(1): 1992: 75-82

This work reports that the parameter  $k$  (factor correcting the properties of the multilayer) in the GAB sorption equation varies from nearly unity to as low as 0.56 for a large var. of food constituents and related materials. Values of  $k$  for proteins fall in a relatively narrow range of 0.82 - 0.88 (av. 0.84 plus or minus 0.03 SD), while for starchy materials they fall in the range 0.70 - 0.77 (av. 0.74 plus or minus 0.03 SD). AA



Nil

## FOOD CHEMISTRY AND ANALYSIS

### Chemistry

518

Alaimo (LH), Ho (C-T) and Rosen (JD). **Effect of protein glycation on subsequent volatile formation.** *Journal of Agricultural and Food Chemistry* 40(2); 1992: 280-283

Lysozyme was incubated with glucose at 25°C and either 12%, 65% or 76% RH for 30 days or at 50°C and 65% RH for 3 days. The volatiles generated by the subsequent heating of the glycated samples and their individual polymeric components were trapped and analyzed by GC/MS. The glycated lysozyme incubated at 25°C showed qualitative differences in volatiles generated at different RH. The sample incubated at 50°C generated more glucose-derived volatiles than the 25°C samples. Different volatiles were generated from each of the polymeric components isolated from the 50°C sample of glycated lysozyme. It was demonstrated that storage conditions have an effect on the nature of volatiles generated upon subsequent heating. AA

519

Schopplein (E) and Dietrich (H). **Characterization of polysaccharide degrading enzymes in a technical pectinase preparation.** *Deutsche Lebensmittel-Rundschau* 87(7); 1991: 212-219 (De)

An endo-arabinanase, an arabinofuranosidase, a  $\beta$ -1,4-galactanase and endo-polygalacturonase were isolated and biochemically characterized from a technical pectinase. Mol. wt., isoelectric points,  $K_M$ -values, temp.- and pH-optima as well as temp.- and pH-stability were determined. The mechanism of reaction was examined with the pure substrate. Finally the enzymatic degradation of fruit and juice polymers was investigated. AA

520

Maslowska (J) and Leszczynska (J). **A new enzymatic method for the determination of Mg(II) in drinking waters and soft drinks with the use of isocitrate dehydrogenase.** *Deutsche Lebensmittel-Rundschau* 87(7); 1991: 220-222

A procedure is described how to utilize the activation of isocitrate dehydrogenase with Mg(II) for the detn.

of the  $Mg^{2+}$  content in water and drinks. The limit of detection of  $Mg^{2+}$  in this method is 0.24 mg/ml. The developed method includes procedures for the preparation of samples and making measurements. It has been shown that the content of Mg(II) in the tested samples of drinking water and drinks is from 0.94 to 3.15 mg/l. The new enzymatic-spectrophotometric method is simple and sensitive and can be of great service in control of the Mg(II) level in drinks and food products. AA

### Chemistry (Analytical)

521

Barbera (R), Farre (R) and Mesado (D). **Determination of Cd, Co, Fe, Pb, Mn, Ni and Zn in diets: Development of a method.** *Die Nahrung* 35(7); 1991: 683-687

A method useful for the detn. of Cd, Co, Cu, Fe, Pb, Mn, Ni and Zn in diets is described. Organic matter is destroyed applying a wet procedure, and element content is measured by flame atomic absorption spectroscopy (FAAS) in the case of Cu, Fe, Mn, Ni and Zn, and by graphite furnace (GF-AAS) in the case of Cd, Co and Pb. The matrix interference study is carried out. Values found for linearity, detection and quantitation limits as well as accuracy show that the described method is useful to determine the elements taken into account at usual levels in diets. AA

522

Patel (PD). **The applications of lectins in food analysis.** *Trends in Food Science and Technology* 3(2); 1992: 35-39

Reviews the recent progress in the uses of lectins and labelled lectins in food analysis. Topics covered are estimation of polysaccharide additives (guar gum, locust bean gum) in food determining the presence of terminal glycosyl unit in glycoproteins and lipopolysaccharides; mechanism of lectin reaction; application of lectins in detecting microorganisms and moulds; interactions with bacteria of epidemiological significance and in virus detection. GS

523

Wedzicha (BL), Bellion (IR) and Goddard (SJ). **Infrared and ultraviolet spectra of sulphur (IV) oxospecies in water-non-electrolyte mixtures.** *Food Chemistry* 44(3); 1992: 165-171

Ultraviolet spectra of solution containing  $NaHSO_3$  in water-non-electrolyte (ethanol, glycerol, polyethylene glycol, sucrose) mixtures show a decrease in the intensity of the peak due to  $S_2O_5^{2-}$



with increasing non-electrolyte concn. Infrared spectroscopy in water-glycerol mixtures is consistent with the possibility that addition of glycerol reduces the concn. of  $\text{S}_2\text{O}_5^{2-}$ . It is possible that  $\text{S}_2\text{O}_5^{2-}$  ions may be less important in partially dehydrated foods than expected from the known behaviour of  $\text{NaHSO}_3$  in simple aqueous solutions. AA

524

Sen (NP), Baddoo (PA), Seaman (SW) and Weber (D). **Simultaneous determination of 2-(hydroxymethyl)-N-nitrosothiazolidine-4-carboxylic acid and 2-(hydroxymethyl)-N-nitrosothiazolidine in smoked meats and cheese.** *Journal of Agricultural and Food Chemistry* 40(2); 1992; 221-226

A method is described for the detn. of the two title compounds in various cured smoked meats, including bacon, smoked poultry products, and smoked cheeses. It is based on (a) extraction of the sample with methanol or acetonitrile, (b) removal of fats and lipids by partitioning of the extract with isooctane, (c) cleanup and separation of the 2 compounds on an acidic alumina sample preparation cartridge, (d) derivatization of 2-(hydroxymethyl)-N-nitrosothiazolidine-4-carboxylic acid to its methyl ester (HMNTCA-ME), and (e) detn. of HMNTCA-ME and 2-(hydroxymethyl)-N-nitrosothiazolidine (HMNTHZ) by HPLC thermal energy analyzer technique. The recoveries of HMNTHZ and HMNTCA added to various products at 10 - 20 and 50 - 200 p.p.b., respectively, varied between 82 - 112% (mean, 94%) and 58 - 101% (mean, 79%). Confirmation was carried out by GLC-MS analysis of HMNTHZ as its O-methyl ether and of HMNTCA-ME as its heptafluorobutyl derivative. AA

525

Schwedt (G). **A compound method comprising calorimetry and ion chromatography for use in calorific-value and mineral-contents analyses in foodstuffs.** *Deutsche Lebensmittel-Rundschau* 87(7); 1991; 223-224 (De)

The burning of food samples in a calorimeter bomb (in pure oxygen) to determine the physical calorific value was used as the decomposing procedure for subsequent ion chromatography (IC) analysis of the minerals Na, K, Ca and Mg. to make it a compound procedure. To this effect, a quantitative solution steps for the ashes from the calorimeter bomb, with the elutriant for the IC analysis - EDTA-serving at the same time as a solvent for the ashes was developed. Separation of cations was done on polybutadiene maleic acid coated silica gel (Metrohm Super-Sep cation separation column), detection by

means of a conductivity detector. A comparison of this solubilizing method with dry incineration at 600°C yielded results of good congruence. AA

526

Mukhopadhyay (D) and Karmakar (SK). **Modernization of testing in processed food sector-problems and agenda for action.** *IS: Bulletin* 6(2); 1992; 51, 52

The lead taken by BIS towards augmenting its lab. facilities and exposing the industry to EEC opinion are discussed. Aspects discussed include standardization in food products, modernization of testing facilities, and international exposure. SRA

## FOOD MICROBIOLOGY AND HYGIENE

### Microorganisms

527

Kone (K) and Fung (DYC). **Understanding bacteriocins and their uses in foods.** *Dairy, Food and Environmental Sanitation* 12(5); 1992; 282-285

Food processors, researchers, or regulatory agents concerned with the safety of food supply with bacteriocins and their potential uses are briefly summarised in this article. Aspects included are: bacteriocins, factors affecting bacteriocin production, methods of detection and purification, bacterial susceptibility to bacteriocins, bacteriocins of lactic acid bacteria, properties of bacteriocins, use of nisin as a GRAS (generally recognized as safe), and future research. SRA

528

Ito (H). **Decontamination of microorganisms without heating (ultraviolet, ionizing radiation and ozone).** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 38(1); 1991; 72-77 (Ja)

### Bacteria

529

Varadaraj (MC). **Methods for detection and enumeration of foodborne bacterial pathogens: A critical evaluation.** *Journal of Food Science and Technology (India)* 30(1); 1993; 1-13

The increasing consumer awareness has laid a greater emphasis on producing microbiologically safe foods for human consumption. A few important foodborne bacterial pathogens are predominant in foods and thus, are responsible in causing serious



public health hazards. In this context, it becomes necessary to subject the foods to accurate microbiological analysis, particularly for these dominating bacterial pathogens. This review critically analyses the methods of detection and enumeration of foodborne pathogenic bacteria with specific reference to the advantages and limitations of the methods. 89 references. AA

530

Patchett (RA), Back (JP), Pinder (AC) and Kroll (RG). **Enumeration of bacteria in pure cultures and in foods using a commercial flow cytometer.** *Food Microbiology* 8(2): 1991; 119-125

Use of the Skartron Argus 100 flow cytometer enabled the counting of pure cultures of bacteria to  $< 10^3$  cfu ml<sup>-1</sup> within a few min. Application of the technique to meat samples gave a good correlation with plate counts and enabled enumeration down to at least  $10^5$  cfu g<sup>-1</sup> within min. However, with samples of pate and milk, sensitivity was reduced. SRA

531

Earnshaw (R) and Gidley (J). **Molecular methods for typing bacterial food pathogens.** *Trends in Food Science and Technology* 3(2): 1992; 39-43

Reviews the latest mol. techniques like finger printing, plasmid profiling, pulsed-field gel electrophoresis and ribotyping, which help food microbiologists to detect differences and similarities between closely related bacteria; and which ultimately, can be used to control microbial hazards and facilitate quality control of food. 46 references. GS

532

Ozen (S) and Ozilgen (M). **Effects of substrate concentration on growth and lactic acid production by mixed cultures of *Lactobacillus bulgaricus* and *Streptococcus thermophilus*.** *Journal of Chemical Technology and Biotechnology* 54(1): 1992; 57-61

The kinetics of growth and lactic acid production by mixed cultures of *L. bulgaricus* and *S. thermophilus* were modeled with a set of modified logistic and Luedeking-Piret equations. The specific growth rates and the inhibitory effect of each individual species on the mixed culture growth were found to be determined by the media composition. The kinetic analysis clearly showed that the contribution of each microbial species to the mixed culture growth process changed drastically when the substrate concn. was about 15%. This optimum initial substrate concn. was in agreement with the results of the previous studies and the optimum

found by trial and error procedure in commercial yoghurt production. AA

### ***Bifidobacterium bifidum***

533

Corre (C), Madec (M-N) and Boyaval (P). **Production of concentrated *Bifidobacterium bifidum*.** *Journal of Chemical Technology and Biotechnology* 53(2): 1992; 189-194

A low-cost medium was developed to produce expensive dairy starter cultures easily and economically. Conc. suspensions of *Bifidobacterium bifidum* were obtained in a continuous process using a continuous stirred tank reactor coupled to an ultrafiltration device in non-anaerobic conditions. Bacterial productivity of  $2 \times 10^8$  organisms cm<sup>3</sup> h<sup>-1</sup> were achieved using a whey-based medium, a 15-fold improvement on batch productivity. The starter culture suspensions could be stored at 4°C or frozen without washing, or with the addition of cryoprotective media, with maintenance of high viability. AA

### ***Lactobacillus bulgaricus***

534

Buyukgungor (H). **Stability of *Lactobacillus bulgaricus* immobilized in k-carrageenan gels.** *Journal of Chemical Technology and Biotechnology* 53(2): 1992; 173-175

The future application of immobilized microorganism techniques will depend on the development of systems which are technologically applicable on an industrial scale. These techniques must permit high microbial concn. and must allow mass transfer to take place with low diffusional limitations. In addition, the mechanical separation of the immobilized microorganisms must be achieved economically. *k*-Carrageenan was used as an ionotropic gel carrier for the immobilization of *Lact. bulgaricus* (ATCC 11842), and the effects of gel stability on productivity and the rate of product formation were investigated. *k*-Carrageenan gels had higher mechanical and chemical stability than alginate gels. The storage stability of microorganisms immobilized in *k*-carrageenan was good enough to retain biocatalytic activity during prolonged storage at 4°C. AA

### ***Listeria***

535

Farber (JM). **Prevention and control of foodborne listeriosis.** *Dairy, Food and Environmental Sanitation* 12(6): 1992; 334-340



Control of *Listeria monocytogenes* in dairy industry (control at farm level and at the dairy plant), meat industry, seafood industry is discussed in this article. SRV

## BIOTECHNOLOGY

536

Dua (S), Kaur (M) and Aini, Aalia (AS). **Functional properties of two pollutant grown green algae.** *Journal of Food Science and Technology (India)* 30(1): 1993: 25-28

*Scenedesmus obliquus* and *Klebsormidium flaccidum* (filamentous) were predominant algae collected from polluted areas. Studies on the functional properties of their proteins showed that the isoelectric point of these proteins was in acidic range. Their solubility decreased in NaCl and ammonium sulphate sol., while relative viscosity decreased in the presence of urea and sodium lauryl sulphate. Foaming capacity and emulsifying activity were min., while emulsion stability was max. around isoelectric point. The viscosity, foaming and emulsification properties of *Scenedesmus* protein were more than *Klebsormidium* protein at equal protein concn. (0.4%). AA

537

Arad (SM) and Yaron (A). **Natural pigments from red microalgae for use in foods and cosmetics.** *Trends in Food Science and Technology* 3(4): 1992: 92-97

Red microalgae with their accessory pigments known as phycobiliproteins (red or blue) are potential natural colorants for use in foods. Aspects reviewed in this article are: red algae, red microalgae, cultivation in closed systems, characteristics and structure of the phycobiliproteins, effects of culture conditions on the content of phycobiliproteins, characteristics of the natural dyes from red microalgae, stability of natural algal colorants, applications and regulatory status of algal pigments and future developments. 17 references. BV

538

Krysteva (MA) and Yotova (LK). **Multienzyme membranes for biosensors.** *Journal of Chemical Technology and Biotechnology* 54(1): 1992: 13-18

Artificial multienzyme complexes were prepared in which enzymes were covalently bound to polysaccharide structures activated with urea and formaldehyde. Double enzyme complexes of glucose

oxidase and catalase, a glucose oxidase and invertase, were prepared by immobilization on to cellulose fabric. Also, catalase was covalently bound to soluble dextran. The resulting multienzyme systems were highly active and stable, making them suitable for use in measuring the concn. of glucose and saccharose in solution. The measurements were performed using an amperometric oxygen electrode and multienzyme membranes containing glucose oxidase and catalase for the first substrate, as well as glucose oxidase bound to cheese-cloth and a 'liquid' membrane of dextran-bound catalase. To determine the concn. of saccharose, a multienzyme membrane with bound glucose oxidase and invertase was used in combination with a 'liquid' dextran-catalase. The enzyme electrodes exhibited a measuring range of 0.1 - 5 mol. dm<sup>-3</sup> and a response time of 2 - 3 min. The electrodes may be used for measuring saccharose and glucose concn. both in fermentation broths and food products. AA

539

Papamichael (N), Borner (B) and Hustedt (H). **Continuous aqueous phase extraction of proteins. Automated processing and recycling of process chemicals.** *Journal of Chemical Technology and Biotechnology* 54(1): 1992: 47-55

A 2-stage aqueous phase extraction of the enzyme fumarase from baker's yeast is described with respect to the recycling of the upper effluent phase from the secondary extraction. It was found that the binodal curve position was only slightly altered by the presence of protein at different load levels and that enzyme specific activity in the product was improved at higher total protein concn., which simplified the recycling strategy. On-line enzyme and protein assays showed that disturbances during start-up and desludging operations were reflected in variations in the protein concn. in the various streams, but that the enzyme activities remained relatively stable. Recycling reduced, the polyethylene requirements by 50% and that for potassium phosphate by 12%. A max. saving of PEG (polyethylene glycol) of approx. 70% was achieved at optimum conditions of extraction, compared to a value of 90% predicted by a theoretical description of the system. An economic analysis of the recycled process showed significant advantages compared with a non-recycled system, even though the capital outlay requirements for an automated, continuous system are much higher than for a manually run process. AA

540

Hussein (AM), El-Saied (H) and Yasin (MH). **Bioconversion of hemicelluloses of rice hull black liquor into single-cell protein.** *Journal of Chemical Technology and Biotechnology* 53(2): 1992: 147-152



Rice hulls were treated using several NaOH concn. and temp. The black liquor contents of silica, lignin and hemicelluloses increased with increase in temp. or NaOH concn. Hexoses constituted the major part and pentoses the minor part of the black liquor hemicelluloses. The ratio of pentoses to hexoses increased slightly with the increase of treatment variables. The pentose content of the black liquor consisted of arabinose and xylose, while the hexose composition was mannose, galactose, rhamnose and glucose. On increasing the alkali concn. the xylose and mannose concn. increased greatly, while galactose and glucose increased only slightly. Using 10 soil samples several isolates of fungi and actinomycetes were obtained. These were identified as 5 species of genus *Aspergillus*, 3 sp. *Paecilomyces*, 2 sp. *Penicillium*, one sp. each of *Alternaria*, *Trichoderma*, *Chaetomium* and *Actinopolyspora*. The fungi were cultivated on black liquor basal salts medium. The highest biocoverion rate of black liquor hemicelluloses into biomass and single-cell proteins was achieved by *Aspergillus terreus*, followed by *Paecilomyces simplicissima* then *Actinopolyspora* sp. AA

## TISSUE CULTURE

Nil

## FOOD ADDITIVES

541

Khanna (SK) and Mukul Das. **Safety and risk impact of intentionally added non-prescribed chemical additives in foodstuffs.** *ISI Bulletin* 6(2): 1992: 43-47

The extent of use of permitted and non-permitted food colours in milk and their products: confectionery, drinks and spice powders, edible oils and in cereals and pulses. This is based on authors survey conducted in Uttar Pradesh, India. SRA

## Antioxidants

542

Thurnham (DI). **Functionally important antioxidants and free radical scavengers in foods.** *Food Science and Technology Today* 6(1): 1992: 42-46

Covers formation of free radicals, normal control of radical formation, radical-initiated damage, physiological control of Fe, lipid peroxidation, nutritional factors and antioxidant defences.

influence of dietary intake on radical defence; influence of dietary antioxidants on health and dietary advice and conclusions. BV

## Colourants

543

Francis (FJ). **A new group of food colorants.** *Trends in Food Science and Technology* 3(2): 1992: 27-30

This feature article examines the recently discovered group of acylated B-ring-substituted anthocyanins as a potential stable natural food colorants. They are stable and show increased coloration at pH values of 4.0 - 5.5, where conventional anthocyanins are nearly colourless. Topics discussed include conventional anthocyanins and anthocyanins substituted in the B-ring (stability due to acylation and substitution). The acylated B-ring-substituted anthocyanins have not been commercialized as since none of the sources are recognized as normal food plants (*Tradescantia pallida*, *Ipomoea tricolor*). BV

## CEREALS

544

Jood (S) and Kapoor (AC). **Effect of storage and insect infestation on protein and starch digestibility of cereal grains.** *Food Chemistry* 44(3): 1992: 209-212

Protein and starch digestibility of wheat, maize and sorghum grains increased marginally during storage, except for starch digestibility of sorghum which increased significantly ( $P < 0.05$ ) after 4 months of storage. Protein and starch digestibility of 3 cereal grains having 25, 50 and 75% grain infestation caused by *Trogoderma granarium* Everts and *Rhizopertha dominica* Fabricius separately and in mixed form were affected significantly ( $P < 0.05$ ) and adversely. *T. granarium*, primarily a germ feeder, reduced protein digestibility of wheat and maize more than did *R. dominica* or mixed population of both insect sp. By contrast, *R. dominica*, an endosperm feeder, reduced starch digestibility of 3 cereal grains compared with *T. granarium* and mixed population. The reduction in digestibility was dependent on the distribution of proteins and starch in seed components as well as feeding preferences of insects. AA

## Barleys

545

Clarkson (SP), Large (PJ) and Bamforth (CW). **Oxygen-scavenging enzymes in barley and malt**

and their effects during mashing. *Journal of the Institute of Brewing* 98(2): 1992: 111-115

Of the enzymes that may be involved in the scavenging of oxygen radicals in barley and malt, superoxide dismutase, catalase and peroxidase all increase their specific activities during malting, whereas polyphenol oxidase decreases to zero. Of these, however, only the isoenzymes of peroxidase survive (in part) in the mash, and are responsible for the oxidation of polyphenolic materials. The concn. of hydrogen peroxide normally found in wort limits their action. Addition of hydrogen peroxide to the mash or its generation via a glucose oxidase system greatly increases haze formation, decreases the polyphenol content and causes the development of a red coloration. When the same amount of the different malt peroxidase isoenzymes was added to mashes, the intensity of the red colour varied according to the isoenzyme used. The worts produced by enhanced peroxidation afford more colloiddally stable beers. The effects however are limited by the dissolved oxygen concn. in the wort. AA

## Rice

546

Saikia (L) and Bains (GS). **Studies of some Assam rice varieties for cooking, organoleptic and visco-elastic properties.** *Journal of Food Science and Technology (India)* 30(1): 1993: 40-41

Studies of cooking, organoleptic and visco-elastic properties of 3 var. of Assam rice revealed comparatively higher cooking time, water-uptake and elongation ratio for brown and milled rice. 'Jaha', a scented var., scored highest in aroma but was inferior in terms of non-cohesiveness, integrity, alkali spreading and clearing. 'Monoharsali' and 'Prosadbhog' gave higher peak viscosity and 'Jaha' lowest gelatinization time. Correlation coeff. between amylose, fat and protein with water-uptake and elongation ratio were estimated. AA

547

Harish Chander and Berry (SK). **Potential of storage insect pests to breed in traditional products of rice.** *Journal of Food Science and Technology (India)* 30(1): 1993: 60-61

Breeding potential of *Tribolium castaneum*, *Rhyzopertha dominica* and *Sitophilus oryzae* in salted parmal, puffed rice and beaten rice showed that mortality of adult insects was negligible during 3 wks in all products except for full mortality of *S. oryzae* on beaten rice in 2 wks. Larval development of *T. castaneum* was significantly slower in salted parmal and phullan as compared to that in raw rice.

The larvae of *R. dominica* took significantly longer time to develop in salted parmal. *T. castaneum* produced lowest progeny in salted parmal and sweetened phullan, whereas *R. dominica* produced max. progeny in plain and sweetened phullan causing 27.9 and 19.5% loss in wt. respectively during 3 months. The rice weevil, *S. oryzae*, could not breed in any of the traditional products of rice tested in this study. AA

548

Narpinder Singh, Baljit Singh and Sekhon (KS). **Relationship between fissured kernels and cooking characteristics of rice.** *Journal of Food Science and Technology (India)* 30(1): 1993: 68-69

Regression models to predict relationship between % fissured kernels and cooking characteristics of rice have been formulated. Gruel solid loss and alkali spread value were correlated positively to fissured kernels with correlation coeff. of 0.66 to 0.93 and 0.94 to 0.96, respectively, for various var. Water uptake and cohesiveness scores were correlated negatively to % fissured kernels with correlation coeff. in ranges of 0.71 to 0.86 and 0.65 to 0.81, respectively. AA

549

Sajwam (KS), Kaplan (DI), Mittra (BN) and Pande (HK). **Milling quality of rice as influenced by time of harvesting and storage conditions.** *Tropical Agriculture* 69(3): 1992: 296-300

Harvesting of Jaya, Pusa 2-21 and Ratna rice var. 32 days after flowering gave the highest yield. The storage time and duration did not affect the grain protein and mill yield. Paddy stored in metal drums resulted in grain hardness than bamboo mud-plastered bin or gunny bag storage. The gunny bag storage resulted in rapid fall in seed viability in terms of germination percentage. SD

550

Agnihotri (NP) and Yadav (TD). **Determination of residues of deltamethrin on rice and wheat stored under Food Corporation storage system.** *Bulletin of Grain Technology* 29(1): 1991: 6-8

Wettable powder (2.5%) of deltamethrin (K-othrine) was sprayed on rice and wheat stacks in jute bags with an expected deposits of 10 and 20 mg/m<sup>2</sup> respectively. GLC analysis of insecticide residues showed that all the samples of rice and wheat were free from deltamethrin residue, except 1 cm deep samples of rice which gave 0.02 p.p.m. residue. GS



## Rice bran

551

Bera (MB). **Use of deoiled rice bran: Present status and future possibilities.** *Indian Food Industry* 11(3): 1992: 36-38

Aspects covered are the nutritional significance of deoiled rice bran, food uses of rice bran, rice bran protein conc. and its functional properties (nitrogen solubility, emulsifying capacity, foaming capacity and flow behaviour properties) and the nutritional significance of deoiled rice bran protein conc. CSA

## Wheat

552

Joshi (BC), Prajapati (SK), Srivastava (JL), Lal (S) and Yadav (AS). **Studies on quality of rain affected wheat crop in Mathura district of UP.** *Bulletin of Grain Technology* 29(1): 1991: 42-45

Unseasonal rain affected samples of wheat (500 g each) collected were analysed for physical quality parameters like foreign-matter, other food grains, damaged grains, slightly damaged grains, shrivelled and broken, weevilled and lustre loss, moisture content, germination, fungi and aflatoxin contamination. Results indicated that it is necessary to do thorough quality assessment of those food grains which are affected with rain during harvesting. The lustre loss was between 40 and 100%. All the other refractions like foreign matter, other food grains, damaged grains were in high proportion. 12 fungi were identified and *Aspergillus flavus* was found in all samples. About 33.3% samples were contaminated with aflatoxin B<sub>1</sub>. GS

553

Singh (YP) and Mall (NP). **Effects of various grain protectants on germination and damage of wheat grains by *Sitophilus oryzae* Linn.** *Bulletin of Grain Technology* 29(1): 1991: 50-54

Comparative efficacy of oil and cake of castor (*Ricinus communis*), neem (*Azadirachta indica*), mustard (*Brassica juncea*), linseed (*Linum usitatissimum*) and powders of *Ipomea carnea* and *Melia azedarach* was evaluated as grain protectants against *Sitophilus oryzae* Linn. infesting stored wheat under lab. conditions (27 plus or minus 1°C temp. and 75 plus or minus 5% RH). The viability of wheat grains ranged from 83.97 to 94.25% and none of the treatment affected it adversely. Significantly less number of beetles were obtained in the grains treated with neem oil (7.66) which was followed by *I. carnea*, *M. azedarach* and neem cake being 14.33, 16.00 and 17.33 respectively. The

grain damage as well as loss in wt. were min. in neem oil treated grains (6.66 and 3.54%, respectively). The seeds treated with neem cake, linseed oil, *I. carnea* and *M. azedarach* also proved effective in comparison to untreated ones. GS

554

Patnaik (G). **Export potential for wheat and wheat products.** *Indian Miller* 22(6): 1992: 31-34

World production of wheat, domestic consumption (per capita net availability of food grains in India), export potential for wheat and flour from India are covered. SRA

## Wheat flour

555

Prieto (JA), Ebri (A) and Collar (C). **Optimized separation of nonpolar and polar lipid classes from wheat flour by solid-phase extraction.** *Journal of the American Oil Chemist's Society* 69(4): 1992: 387-391

A method combining solid-phase extraction on prepacked silica and aminopropyl bonded-phase (Bond-Elut) columns has been developed for the separation of neutral lipids, glycolipids and phospholipids from wheat flour into individual classes in high yield and homogeneity. Chromatography on a single silica column (500 mg) with solvent combinations of increasing polarity resulted in complete separation of steryl esters, triglycerides, free fatty acids, 1,2-diglycerides, 1,3-diglycerides, monoglycerides, monogalactosylglycerides, digalactosylglycerides, phosphatidylcholine and lysophosphatidylcholine. Chromatography on an aminopropyl bonded-phase column (500 mg) with ternary mixtures of chloroform/methanol/ammonium hydroxide led to the proper separation of N-acyl-phosphatidylethanolamine and N-acyl-lysophosphatidylethanolamine, previously coeluted on the prepacked silica column. Cross contamination among phospholipid classes tested by normal-phase HPLC was always < 14%. AA

556

Conforti (FD) and Johnson (JM). **Use of the farinograph in predicting baking quality of unchlorinated and chlorinated flours.** *Journal of Food Quality* 15(5): 1992: 333-347

The viscoelastic properties of 6 soft wheat flour (Coker 916), chlorinated and unchlorinated, and their baking properties were analysed. Chlorination increased the absorbency of the flour resulting in a stable product with firmer crumb. The stability,

mixing tolerance index and peak time showed significant correlation with baking quality which could predict the quality of chlorinated flour. SD

## MILLETS

557

Hadimani (NA) and Mallesh (NG). **Studies on milling, physico-chemical properties nutrient composition and dietary fibre content of millets.** *Journal of Food Science and Technology (India)* 30(1), 1993; 17-20

Pearl millet and small millets were studied for milling characteristics and the milled fractions were analysed for chemical composition and dietary fibre content. The milled grains were also evaluated for cooking quality. The yields of milled grains, bran and husk varied from 63.2 to 90.0%, 5.0 to 11.0% and 1.5 to 29.3% respectively. Milled grain contained about 90 and 70% of the grain protein and grain fat, respectively. The oil contents of the bran from pearl, finger and other small millets were 15, 3 and 23 - 27% respectively. The total dietary fibre contents of milled grains ranged from 9 - 16% out of which 32 - 50% was soluble dietary fibre. Milled millet grains cooked soft within a short period when added to boiling water. The Brabender visco-amylograms of milled millet flour indicated a gelatinisation temp. of about 75 plus or minus 2°C peak viscosity of 220 - 560 BU, breakdown viscosity of 20 - 120 BU and cold paste viscosity of 340 - 1120 BU. AA

## Corn

558

Singh (KN), Tiwari (R) and Lal (S). **Studies on losses in maize in relation to storage structures in the villages of district Udaipur (Rajasthan).** *Bulletin of Grain Technology* 29(1); 1991; 3-5

Maize stored for 4 and 8 months in (i) kachcha kothi (mud structure), (ii) pucca rothi (Bakhari stone slab structure) and (iii) metal bin/drums, were analysed for moisture, germination % and wt. loss. Max. storage loss was in (i) and the min. in (iii). Wt. loss and moisture increased with the storage period; and germination was unaffected. GS

559

Dakshinamurthy (A). **Pre-harvest spray of insecticides in maize for the management of *Sitotroga cerealella* Olivier in storage.** *Bulletin of Grain Technology* 29(1); 1991; 63-64

Four pre-harvest sprays on the management of *S. cerealella* Olivier in the storage of maize viz. (i) endosulphan 0.05% (T<sub>1</sub>), (ii) malathion 0.05% (T<sub>2</sub>), (iii) dichlorvos 0.05% (T<sub>3</sub>), (iv) etrimphos 0.05% (T<sub>4</sub>) and (v) control water spray (T<sub>5</sub>) showed that they were significantly better than control in preventing *S. cerealella* in maize. Etrimphos 0.05% spray was most effective. GS

## Sorghum

### Sorghum flour

560

Anju Rao and Vimala (V). **Efficacy of tricalcium phosphate on the storage quality of sorghum flour.** *Journal of Food Science and Technology (India)* 30(1); 1993; 58-59

The efficacy of tricalcium phosphate (2%) as pre storage treatment in whole and dehulled sorghum flour has been studied. Treatment with tricalcium phosphate controlled insect infestation and associated changes in fat acidity, alcoholic acidity, and lipase activity. A positive correlation between fat acidity and lipase activity was observed. Dehulling prior to milling contributed to better storage quality. AA

## PULSES

### Blackgram

561

Krishna Rao (V), Ratnasudhakar (T) and Sreeramamurthy (K). **Effect of storage structures on grain mycoflora and viability of blackgram during storage.** *Bulletin of Grain Technology* 29(1), 1991; 9-13

*Buttaminumu* and *Netimminumu*, two var. of blackgram (*Phaseolus mungo*) were stored upto 150 days in (i) jute gunny bag (polyethylene lined), (ii) jute gunny bag, (iii) nylon gunny bag and (iv) steel bin in Bapatla mandal, Guntur, Andhra Pradesh. Moisture contents of *Buttaminumu* and *Netimminumu* ranged from 8.0 to 11.2% and 8.1 to 12.7% respectively for the whole period indicating that moisture was not influenced by the type of storage structure or the var. However, moisture content decreased in all the storage structures up to 120 days and increased at 150 days due to changes in atmospheric temp. and RH. *Buttaminumu* and *Netimminumu* stored in steel bin and nylon gunny bag recorded highest germination respectively. Seed borne fungi was less in both var. stored in jute gunny bag. GS



## Cowpeas

562

Uzogara (SG) and Ofuya (ZM). **Processing and utilization of cowpeas in developing countries: A review.** *Journal of Food Processing Preservation* 16(2): 1992; 105-147

In this review methods of circumventing constraints to cowpea (*Vigna unguiculata* and *Vigna sinensis*) utilization such as pest infestation, beany flavours and odour, presence of antinutrients and extended cooking times are outlined. Milling or grinding, dehulling, soaking, germination (sprouting), fermentation, heat treatment techniques, alkaline treatment and popular cowpea foods (akara-deep-fat-fried bean balls, moin-moin-steamed cowpea paste, ewa-ibeji boiled cowpeas, awuje-soft boiled cowpeas, danwake-cowpea dumplings, begiri-cowpea soup, cowpea spread, roasted cowpea, baked cowpea products, infant weaning foods, extruded cowpea products, fermented cowpea products, germinated cowpeas, ready-to-eat cowpea foods) are reviewed. Use of cowpea in infant and adult foods in traditional and novel products is recommended to combat malnutrition. 187 references. SD

## Dry beans

563

Del Valle (JM), Stanley (DW) and Bourne (MC). **Water absorption and swelling in dry bean seeds.** *Journal of Food Processing Preservation* 16(2): 1992; 75-98

A modified first-order reaction model composed of an initial linear phase followed by a diffusion-controlled phase closely predicted water absorption and swelling in several var. of fresh and stored beans. Dehulling resulted in increased rates of water absorption, but equilibrium values for both water absorption and swelling were reduced as a result of elimination of water held between the seed coat and the cotyledons as well as between the cotyledons. Swelling of dehulled seeds was reduced initially, since the seed coat swells faster than the cotyledons in the initial stages of water uptake. Addition of carbonate salt to the soaking sol. generally reduced water absorption and swelling. The hard-to-cook defect was manifested by reductions in the rates of water uptake and diminished effects of dehulling and salt soaking on water absorption and swelling. Water absorption was significantly and negatively correlated with cooked bean hardness. AA

## Fababeans

## Fababean proteins

564

Schwenke (KD), Anders (K), Junker (B) and Schneider (Ch). **Chemical and gel electrophoretic characterization of acetylated fababean protein isolates.** *Die Nahrung* 35(7): 1991; 759-766

The extent of modification of amino and hydroxyl groups in acetylated faba bean protein isolates was determined. Gel electrophoretic studies of unmodified and acetylated fababean legumin and protein isolates were carried out in acidic and alkaline buffer systems as well as in a SDS-containing system. A remarkable increase of O-acetylation was found after the N-acetylation has reached a degree of about 60%. Structure changes of the proteins were indicated from the gel electrophoresis patterns in the same region of modification. The quantity of acetyl residues fixed on hydroxyl groups in exhaustively modified protein isolates corresponds to 40% of the total amount of acetyl groups introduced into the proteins. The SDS electrophoresis of the acetylated legumin protein isolates revealed a remarkable increase of the molecular mass of the acidic  $\alpha$ -polypeptide chains only, which is an experimental proof of a preferential acetylation of the latter ones. This gives confirmation of the structural model in which the  $\alpha$ -chains are proposed to be situated on the surface of the protein. AA

## Green gram

565

Ramzan (M), Judge (BK) and Chahal (BS). **Use of wood ash and saw dust for the protection of green gram against pulse beetle, *Callosobruchus maculatus* (L.).** *Bulletin of Grain Technology* 29(1): 1991; 61-62

Covering of green gram with layers of varying thickness of saw dust and wood ash was tried and multiplication of *C. maculatus* (L.) were recorded at 1, 2, 4 and 6 months after release of the pairs. There was no multiplication of the pest or grain damage even in 1 cm layer of wood ash or saw dust, while in the control group, the mean number of adults emerged were 15, 55 and 166 during 2, 4 and 6 months storage respectively. GS

## Red gram

566

Mulimani (VH) and Paramjyothi (S). **Effect of heat and UV on trypsin and chymotrypsin inhibitor activities in red gram (*Cajanus cajan*, L.).** *Journal*

of *Food Science and Technology (India)* 30(1): 1993: 62-63

Red gram seeds were analysed for trypsin and chymotrypsin inhibitor activity and the effects of heat treatment as well as UV exposure on the activities of these anti-nutritional factors. Heat treatment and UV exposure decreased the activities of both trypsin and chymotrypsin inhibitors. Proteinase inhibitors of red gram were found to be heat labile. AA

## OILSEEDS AND NUTS

567

Bhakare (HA), Kulkarni (AS) and Khotpal (RR). **Lipid composition of some seeds of central India.** *Journal of Food Science and Technology (India)* 30(1): 1993: 54-55

Total lipid content of *Acacia catechu*, *Lepidium sativum*, *Nigella sativa* and *Swietenia mahaganii* seeds were 5.7, 13.8, 31.8, 59.4% on dry wt. respectively. Neutral lipids were found to be predominant, while the glycolipids and phospholipids were present in lower quantities. Glycolipids consisted of monogalactosyl diglyceride, digalactosyldiglyceride, acylatedsteryl galactoside and steryl galactoside, while the phospholipids comprised of phosphatidyl choline, phosphatidylethanolamine, phosphatidylinositol, candiolipin and phosphatidylglycerol. Lysophosphatidylethanolamine and lysophosphatidylcholine were present in small amounts. AA

## Coconuts

### Coconut water

568

Maciel (MI), Oliveira (SL) and Da Silva (IP). **Effects of different storage conditions on preservation of coconut (*Cocos nucifera*) water.** *Journal of Food Processing Preservation* 16(1): 1992: 13-22

This study reports the effects of storage temp. (4, 12, 22 and 28°C), time and packing type (with and without polyethylene) of coconuts on coconut water (CW). CW from 6 wrapped and 6 unwrapped coconuts at day 1 and on wks 2, 3, 4 and 5 was taken for physico-chemical (°Brix, total acidity, pH and wt.), microbial and sensory analysis. Acceptability of CW was not affected ( $P < 0.05$ ) by the storage system for 2 wks. The acceptability scores for CW showed higher ( $P < 0.01$ ) values for CW in polyethylene wrapped coconut at 12 and 22°C for 3

wks of storage than those at 4°C. The acceptability scores for CW were higher ( $P < 0.01$ ) for those stored wrapped coconuts at 22°C and those stored unwrapped coconuts at 4°C than other storage systems. Polyethylene-wrapped coconuts stored at 12°C for 4 wks were in better condition than those exposed to the other treatments. BV

## Cottonseeds

### Cottonseed proteins

569

Cho (KC), Park (PSN), Adams (ET) and Rhee (KC). **A simple, rapid and simultaneous preparation of glandless cottonseed 7S and 11S protein fractions and characterization of some physicochemical properties.** *Journal of Food Quality* 15(5): 1992: 357-367

Glandless cottonseed storage proteins yielded 7S and 11S protein fractions of high purity by chromatographic fractionation (rigid and fine gel, sephacoyl S-300 HR). Their physicochemical properties agreed well with literature values. The procedure is superior to all other existing lengthy and cumbersome procedures. SD

## Groundnuts

570

Singh (Y) and Ansari (SU). **Farmers level survey on insects and mites on stored groundnut in Andhra Pradesh.** *Bulletin of Grain Technology* 29(1): 1991: 14-21

The major pests with stored groundnut (*Arachis hypogaea* L.) in pods and kernels are identified and their infestation intensity during pre-sowing and post-harvest sowing. Insects like *Corcyra cephalonica* Staint, *Tribolium castaneum* (Hbst.), *Rhizopertha dominica* (F), *Oryzaephilus surinamensis* (L.), *Ephestia cautella* (Walk), *Caryedon serratus* (Ol) and a mite *Acarus siro* (L) were commonly found in all stored groundnut pods and kernels. Infestation intensity was max. with *Acarus siro* (L) followed by *Oryzaephilus surinamensis* (L) and *Tribolium castaneum*. GS

571

Smith (JSJr) and Sanders (TH). **Moisture content and storage system effects on peanut quality and milling parameters.** *Oleagineux* 46(3): 1991: 121-124

Initial groundnut kernel moisture content (MC) and warehouse ventilation type showed little effect on final MC, shelling rate, shelling efficiency, free fatty



acid value and carbonyl content of groundnuts. Decreases in kernel MC did result in increased split kernel outturn during shelling as well as changes in percentages of individual kernel size categories. Properly designed and maintained warehouses with either mechanical or natural ventilating systems have the capacity to protect groundnut quality throughout the normal storage season with little effect on milling parameters. BV

## Niger

572

Choudhary (PL), Geda (A), Sawarkar (NJ) and Sharma (YK). **Nutritive value of niger varieties.** *Indian Journal of Nutrition and Dietetics* 27(6): 1992: 181-185

Proximate composition of niger seed var., N-5, N-35, N-71, IGP-76 and CHH-1 and their oil quality and nutritive value of cake are reported. Var. N-5 and N-71 showed low free fatty acid content, and better keeping quality than other var. Ca and phytic acid contents were lowest in N-5 and highest in IGP-76 and CHH-1. Ash content was max. in N-71 and low in N-5. Protein content was max. (37.48%) in N-5 and min. (33.68%) in IGP-76. Oil content of var. was 40.29 to 47.02% and max. (47.02%) in CHH-1. GS

## Safflower seed

573

Charjan (SKU) and Tarar (JL). **Effect of container and storage period on storability of safflower (*Carthamus tinctorius*) seed.** *Indian Journal of Agricultural Sciences* 62(8): 1992: 560-562

Safflower seeds, dried to 7% moisture were packed in jute bag, cloth bag and polyethylene bag of 700 guage and stored for 18 months at 10.6 - 43.4°C and 35.8 - 87.3% RH. Seed moisture, germination %, seedling length, seedlings dry wt. and field emergence of seedlings were noted at 3 months intervals. % germination after the storage was 50.0 for cloth, 59.9 for jute and 81 for polyethylene bag stored seeds. Max. period (months) the seeds could be stored was 15 in polyethylene, 9 in cloth and 6 in jute bag. Seedlings from polyethylene bag stored seed were vigorous, had higher dry wt. and length. KAR

## Soybeans

574

Fujita (S) and Suzuki (K). **Enhanced surface activity of food surfactants by addition of soya lysophospholipids.** *Journal of Japanese Society for*

*Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 39(2): 1992: 151-160 (Ja)

Surface activities of food surfactants (emulsifiers), such as sucrose fatty acid ester (SE), polyglycerin fatty acid ester (PGE) and sorbitan fatty acid ester (SOE), were found to be enhanced by blending with soya lysophosphatidylcholine (LPC) or soya lysophospholipids (SLP). The water solubility and acid/salt tolerance of SE and PGE of medium HLB value and of SOE increased due to addition of 20 - 50% (w/w) LPC or SLP. Surface tension of the mixtures (food surfactant/LPC or SLP) took a min. value in a range of ratios from 60:40 to 50:50 (w/w), while a notable decrease of surface tension could be observed by mixing 10 - 30% (w/w) of SLP having about 50% LPC. Immersional wettability (penetrating power) of food surfactants increased with addition of 10 - 20% LPC. Oil/water (o/w) emulsifying ability of food surfactant was fortified by mixing 20 - 30% of LPC or SLP, and the emulsions of vegetable oil became tolerant to salt and acid solution. Water dispersibility of fine particles and  $\beta$ -carotene solubilization of food surfactants were also improved by addition of about 20% LPC or SLP. The results obtained may be brought by the following reason: The nonionic surfactant incorporate with LPC molecules, which have strongly hydrated head group, to form the mixed micelles which possess a similar property to that of small micelles of LPC. AA

575

Srinivas (H), Bhagya Swamylingappa and Nagin Chand. **Secondary extraction of soybeans using hexane-acetic acid: Effect on beany flavour removal and physicochemical properties.** *Journal of Agricultural and Food Chemistry* 40(2): 1992: 276-279

Sensory and physicochemical characteristics of soy meal obtained after secondary extraction of soy flakes using hexane containing 3 and 5% acetic acid were compared with those of hexane-extracted meal. Sensory evaluation study using the threshold dilution technique showed a 55 - 63% reduction of beany flavour in treated meals. Hexane containing 5% acetic acid treatment showed total inactivation of lipoxygenase (L-1 and L-2 + L-3), but no effect on trypsin inhibitor activity. Compared to hexane-extracted meal, the nitrogen solubility index of hexane containing 3 and 5% acetic acid extracted meal showed reductions of 19 and 39%, respectively. *In vitro* digestibility increased in treated samples (81.7%) as compared to that of hexane-extracted meal (76.7%). Gel filtration, polyacrylamide gel electrophoresis, and fluorescence emission spectrum indicated the dissociation of proteins into lower mol. wt. protein fractions in treated meals; the



higher the concn. of acetic acid in hexane, the greater was the extent of dissociation. AA

## Soy products

### Soy flour

576

Sinha (LK) and Nawab Ali. **Preparation of medium fat-soy flour at small scale.** *Journal of Food Science and Technology (India)* 30(1); 1993: 14-16

Process for partial extraction of oil using an expeller and production of flour from partially deoiled soy cake has been developed. The process consists of cleaning, dehulling and splitting of soybean, steaming and flaking of soysplits, deoiling of flakes in a screw press and grinding of edible cake to flour which has < 6% oil and about 50% proteins. The process is potential for producing oil as well as protein-rich flour on a small scale. AA

577

Krishna Jha and Bargale (PC). **Chemical and microbial changes in full-fat soy flour during storage in different packaging materials.** *Journal of Food Science and Technology (India)* 30(1); 1993: 56-57

The changes in total bacteria, lipolytic bacteria, yeast and mould counts, moisture and free fatty acids of full-fat soy flour (FFSF), when stored at 38°C and 90% RH in jute cotton bags, metal containers (tins), LDPE and laminated Al foil packs, have been studied. Moisture impermeable metal containers and laminated Al foil packs gave max. protection to FFSF under above conditions, while jute cotton bags were found to be unsuitable. AA

## TUBERS AND VEGETABLES

### Onions

578

Tyagi (RPS), Bansode (PC) and Lal (S). **Problem of onion storage.** *Bulletin of Grain Technology* 29(1); 1991: 57-60

The factors affecting the storability of onion, such as bulb size, extent of handling injury, variation in atmospheric temp. and RH in storage and storage structures are reviewed. Storage loss ranged from 25 - 50% depending upon weather, var. and type of storage structures. Drying losses during storage ranged from 20 to 30%. Major causes for losses were

sprouting and rotting which could be minimised by careful handling and storage. GS

### Carrots

579

Bolin (HR). **Retardation of surface lignification on fresh peeled carrots.** *Journal of Food Processing Preservation* 16(2); 1992: 99-104

A 20 - 45 second dip in a 60°C, pH 1.0 solution, which could be easily incorporated into the production system, inhibits the development of a white material on the surface of freshly peeled carrots, retaining the original colour and flavour. SD

### Cassava

580

Almazan (AM). **Influence of cassava variety and storage on garl quality.** *Tropical Agriculture* 69(4); 1992: 386-390

Garl, a partially gelatinized dry cassava meal, prepared from 35 clones, showed that the swelling capacity in water at room temp. and in water initially at 90 - 95°C crude fibre concn., garl pH, eba pH and stickiness were significantly different between the samples. Swelling capacity was influenced by crude fibre and protein contents, gel consistency in water and in KOH and amylograph consistency of the paste. Garl with < 10% moisture stored in plastic bags at 25 plus or minus 2°C for 2 - 40 wks showed decreased cyanide concn. and less eba stickiness. SD

### Potatoes

581

Hallberg (ML) and Lingnert (H). **Lipid oxidation in potato slices under conditions simulating the production of potato granules.** *Journal of the American Oil Chemist's Society* 68(3); 1991: 167-170

The formation of volatile compounds in potato slices was analyzed by means of GC headspace analysis. The experimental variables selected for the treatment of the potato slices were chosen to simulate the conditions during the first stages of an "add-back type" of process for production of potato granules. The potato slices (2 cm thick) were exposed to air of low temp. (4°C) and water at blanching temp. (76°C). Both the surface and the middle of each slice were analyzed for volatile compounds. Hexanal was the most abundant aldehyde formed. At the elevated temp., in particular, there was an obvious formation of



hexanal. After 15 min of blanching, the amount of hexanal was higher in the middle of the slices than at the surface. This difference in hexanal concn. was probably due both to the leakage of hexanal into the blanching water from the surfaces of the potato slices, and to the inactivation of lipoxygenase at the surfaces which prevented further oxidation during the subsequent chilling period. The hexanal formation indicates that lipid oxidation occurs during the process. The formation of other volatile compounds also is discussed. AA

582

Kida (Y), Honda (N), Uchida (M), Kunisada (Y) and Fukuda (M). **Changes in ascorbic acid content and several enzyme activities concerning synthesis and metabolism of ascorbic acid in potatoes during storage.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 38(2): 1991; 160-165

Ascorbic acid content and several enzyme activities related to biosynthesis and metabolism of ascorbic acid, namely L-gulonolactone oxidase, monodehydroascorbate reductase, dehydroascorbate reductase, peroxidase, ascorbate oxidase and polyphenol oxidase, in potato tubers were examined to clarify the relationship between physiological conditions of stored potatoes and their ascorbic acid content. During the first month of storage, ascorbic acid content decreased markedly irrespective of storage temp., after which the decrease became gradual. Since several related enzyme activities also changed markedly during the first month, they are assumed to affect the ascorbic acid content of stored tubers. Changes in storage temp. had little effect on these changes. This study showed that a marked change in ascorbic acid content of potato tubers occurred during the initial period of dormancy irrespective of storage temp. AA

583

Mondy (NI), Sharada (D), Munshi (CB) and Wurum (CM). **Effect of storage time, temperature, and cooking on isopropyl N-(3-chlorophenyl) carbamate levels in potatoes.** *Journal of Agricultural and Food Chemistry* 40(2): 1992; 197-199

Factors affecting the residue levels of the sprout inhibitor isopropyl N-(3-chlorophenyl) carbamate (CIPC) in potatoes were studied. Katahdin and Russet Burbank potatoes were dipped in 1% emulsion of CIPC prior to storage. The effects of storage time (1 and 3 months), temp. (5 and 20°C), and 2 methods of cooking (boiling and pressure cooking) on CIPC residue in Katahdin and Russet Burbank potatoes were studied. Tubers stored for 3 months retained lower levels of CIPC than those

stored for 1 month. Potatoes stored at 5°C contained significantly ( $p < 0.01$ ) higher levels of CIPC than those stored at 20°C. Both methods of cooking resulted in significant ( $p < 0.01$ ) losses of CIPC in the peel (periderm). However, the residue of CIPC in the cortex region (under the peel) was significantly ( $p < 0.01$ ) reduced by boiling and significantly ( $p < 0.01$ ) increased by pressure cooking. CIPC retention was significantly ( $p < 0.01$ ) higher in the Katahdin than in Russet Burbank cv. AA

## Potato chips

584

Barrera-Arellano (D) and Esteves (W). **Oxidative stability of potato chips determined by Rancimat.** *Journal of the American Oil Chemists' Society* 69(4): 1992; 335-337

The objective of this research was to assay the behaviour of potato chips in the rancimat and to determine its induction period without extraction of the lipid fraction. Detn. were carried out at 110°C and 20 L/h air flow. The curves for the ground chips were completely different from those obtained with extracted oils. Curves for fresh potato chips showed two inflection points after approx. 5 and 20 h, respectively. Sensory analyses (odor score) of samples withdrawn from the Rancimat after 0, 5, 10, 20 and 25 h showed significant differences ( $P < 0.01$ ). An odor score of 5 was considered the rejection point, and was equivalent to 10.8 h and corresponded to 150  $\mu$ S of electric conductivity. At this point the curves started to level off between the first and second inflection points. Curves obtained with potato chips stored at 25°C for 2, 4, 6, 8, 10 and 12 wk showed the same basis pattern, although prolonged storage corresponded with lower induction time. Correlation of induction values between ground potato chips and extracted oil was high ( $r > 0.87$ ). From these results, it seems that it is possible to estimate the oxidative stability of fat containing foods without prior extraction. BV

## Sweet potatoes

585

O'Neil (CA) and Schwartz (SJ). **Effect of gamma irradiation on isomerization of  $\beta$ -carotene in sweet potato.** *Journal of Food Quality* 15(5): 1992; 315-320

Irradiation of cured sweet potato roots (Georgia Reds) by  $^{60}\text{Co}$ , 500 Krad dose did not lead to isomerization of all-trans- $\beta$ -carotene cis isomers of  $\beta$ -carotene have lower provitamin A activities than all-trans- $\beta$ -carotene, above 97% of which was found in total  $\beta$ -carotene. The process did not decrease



provitamin A due to isomerization in sweet potatoes. SD

## Yams

586

Nnodu (EC) and Alozie (SO). **Using gibberellic acid to control sprouting of yam tubers.** *Tropical Agriculture* 69(4): 1992: 329-332

Yam tubers dipped in gibberellic acid sol. (GA<sub>3</sub> 150 p.p.m.) for 6 h after harvest controlled sprouting upto 45 days of storage. A tank mix of GA<sub>3</sub> could be successively used in treating batches of 21 tubers for 6 h with its sprout-controlling potency. SD

## Vegetables

### Brinjals

587

Bhupinder (K) and Harinder (K). **An improved process for ready-to-eat curried brinjal (*Solanum melongena* Linn.) preparation** (Bhartha). *Indian Food Packer* 46(3): 1992: 9-12

Bhartha was prepared from Punjab Jamuni Gola var. brinjal. Cut brinjals (15 lb/inch<sup>2</sup>) were peeled and mashed, and fried onion, ginger and tomato juice were added. The simmering hot product was filled in A-1 lacquered sterile cans and exhausted for about 10 min to reach a can centre temp. of 90°C. The cans were sealed, processed in autoclave, cooled and stored, dried at room temp. The fresh, processed and stored products were analysed for moisture, pH, TSS (°B) and % acidity. The moisture content of the edible portion of fresh, roasted and steamed brinjal was 91.2, 91.2 and 91.4% respectively. The steamed edible brinjals had high TSS, pH and acidity than raw fruits. Bhartha with an yield of 102%, had better flavour and texture. GS

### Leafy vegetables

#### Spinach

588

Hisaka (H) and Ogura (N). **Relationship of changes of components to that of appearance quality of spinach. Part II. Changes in ascorbic acid contents at various parts of spinach leaves during storage.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 38(1): 1991: 41-43 (Ja)

The ascorbic acid contents at various parts of spinach leaves during storage were measured. The

ascorbic acid contents of spinach leaf blades were higher than those of spinach petioles, and those in the inner leaves were higher than those of outer leaves. Ascorbic acid in outer leaves decreased during storage faster than in inner leaves. The relationship between the rate of ascorbic acid reduction and storage temp. can be expressed as a following equation:  $\text{Loss\%/day} = e^{(0.102 t + 0.11)}$  where e: the base of natural logarithm, t: temp. (°C). AA

## Okra

589

Kaur (B) and Bains (GS). **Comparative studies on 'Ready-to-serve' canned okra/lady's fingers (*Hibiscus esculentus* L.) in brine and tomato juice.** *Indian Journal of Dairy Science* 46(3): 1992: 21-26

A ready-to-serve okra product was canned in tomato juice and in brine. (i) Pusa Sawani and (ii) Punjab Padmani var. of okra were canned after trimming and dicing in 3% brine with and without 0.3% citric acid and also in thinner consistency either as raw or after frying in groundnut oil with addition of tomato juice. The A-1 cans were exhausted to 90°C for brine, 85°C for tomato juice and processed at 115.5°C for 30 min. Cut out analysis of the cans incubated at 37 and 55°C was done for 15 days. The opened cans showed excellent flavour and no bulging of cans was seen. The fried product could accomodate more quantity of the vegetable. Product canned in tomato juice was superior to brine canned product. GS

## Tomatoes

590

Marlatt (C), Ho (C-T) and Chien (M). **Studies of aroma constituents bound as glycosides in tomato.** *Journal of Agricultural and Food Chemistry* 40(2): 1992: 249-252

Glycosidically bound volatiles in fresh tomato have been studied. The glycosides were isolated from an aqueous extract of tomatoes by adsorption onto a column of Amberlite XAD-2, followed by washing of the column with hexane and subsequent elution using methanol; the volatiles were later released from the methanol extract by enzyme-mediated hydrolysis using either a β-glucosidase or a pectinase. Major volatile compounds identified by GC/MS included 2-phenylethanol, benzyl alcohol, benzoic acid, and several shikimate-type products. Also found in small quantities were many monoterpene alcohols and C<sub>13</sub> norisoprenoids. The role of glycosides as possible flavour precursors in tomato is discussed. AA



591

Pal (RK) and Buescher (RW). **Respiration and ethylene evolution of certain fruits and vegetables in response to carbon dioxide in controlled atmosphere storage.** *Journal of Food Science and Technology (India)* 30(1): 1993: 29-32

Respiration was depressed by 10 - 30% CO<sub>2</sub> in ripening bananas, pink tomatoes and pickling cucumbers; increased by 20 - 30% in carrot roots and unaffected by CO<sub>2</sub> exposure in guava, orange and onion bulb. Changes in respiration seldom coincided with changes in C<sub>2</sub>H<sub>4</sub> evolution. Evolution of C<sub>2</sub>H<sub>4</sub> from guavas and tomatoes was substantially reduced by all levels of CO<sub>2</sub>. However, 30% CO<sub>2</sub> accelerated C<sub>2</sub>H<sub>4</sub> evolution in bananas, carrot roots, cucumbers, onions and potatoes which may have been due to an early injury response. AA

592

Zosangliana and Narasimham (P). **Internal atmosphere of some fruits and vegetables.** *Journal of Food Science and Technology (India)* 30(1): 1993: 46-47

The vol. of Interstitial gases or the internal atm. of 8 types of fruits and 7 different vegetables was determined. Internal vol. of gas varied from 1.2 ml/100 g in grapes to 43.8 ml/100 g in pineapple. The oxygen content of the internal air of the fruits and vegetables held under ambient conditions ranged between 14.0 and 19.2%. AA

## Apples

593

Barwal (VS). **Effect of harvesting time and handling period on quality of apple.** *Journal of Food Science and Technology (India)* 30(1): 1993: 42-43

Fruits from 4 promising cvs ('Hardeman', 'Red Spur Delicious', 'Topred' and 'Vance Delicious') were picked on 3 dates between 110 and 125 days after full bloom and their physical and organoleptic characteristics were studied upto 21 days of handling period under ambient conditions. Harvesting dates had no significant effect on the diam. of fruits of 'Hardeman', 'Red Spur Delicious' and 'Topred'. There was significant increase in organoleptic acceptability of fruits of all cvs. Decrease in firmness and physiological wt. loss was found in late harvesting. During handling, organoleptic acceptability was at par upto 14 days in all the cvs expecting 'Vance Delicious'. AA

594

Thakur (VS) and Gupta (GK). **Persistence of dodine residue on apple (*Malus domestica*) fruits.** *Indian Journal of Agricultural Sciences* 62(8): 1992: 566-569

Pre-harvest spray of dodine (N-dodecylaguanidine acetate) was done to apple at 1.50, 3.00 and 4.50 kg/ha and the residue was analysed 1, 2, 5, 10 and 15 days after application. Mean residue content, 15 days after spray was 0.62, 1.07 and 1.32 mg/kg amounting to 82.77, 72.20 and 73.06% loss in 1.50, 3.00 and 4.50 kg/ha applications, respectively. Half life (RL<sub>50</sub>) of dodine calculated from regression coeff. was 5.82, 8.48 and 8.99 days and safe waiting period (for a tolerance limit of 2.0 mg/kg) was 4.9, 8.01 and 10.47 days for 1.50, 3.00 and 4.50 kg/ha application. Conclusion was that dodine 65 wettable powder application at 3.00 kg/ha is safe from toxic residual level with 8 days waiting period from its application. KAR

## Bananas

595

Satyan (SH), Scott (KJ) and Best (DJ). **Effects of storage temperature and modified atmospheres on cooking bananas grown in New South Wales.** *Tropical Agriculture* 69(3): 1992: 263-267

Cooking banana cvs Bluggoe, Pacific plantain, Blue Lubin and Pisang Awak stored in air and modified atm. (MA) at 28, 20, 13, 7 and 3°C showed an increased storage life by a factor 2 in the absence of ethylene absorbent and a factor of 3 when KMnO<sub>4</sub> on aluminium oxide was present. Reducing the temp. from 28 to 13°C further increased the storage. Bluggoe was more susceptible to chill injury and Pisang Awak the least. The dessert cv. Williams was more susceptible than cooking banana cvs. The MA with or without ethylene had no effect on chill injury. SD

## Kinnow mandarins

596

Nagar (PK). **Effect of different harvesting periods on shelf-life and quality of Kinnow fruits.** *Journal of Food Science and Technology (India)* 30(1): 1993: 44-45

The Kinnow mandarin fruits were harvested at different periods and stored at ambient temp. (15 - 20°C) to evaluate their shelf-life and quality. Delaying harvesting beyond 2nd wk of January was found to result in greater loss of fresh wts. than the fruits harvested earlier. While the fruits harvested

in the last wk of December and middle of January showed 11.60 and 13.10% losses during 25 days of storage, the corresponding losses in fruits harvested in 3rd and 4th wk of January were 20.60 and 25%, respectively. Total soluble solids and sugars gradually increased during storage irrespective of harvesting dates and storage. Ascorbic acid and juice contents decreased sharply during storage in fruits harvested after 2nd wk of January. AA

## Litchi

597

Singh (S), Randhawa (JS), Grewal (GPS) and Sharma (RC). **Effect of post-harvest application of fungicides on the cold storage (*Litchi chinensis* Sonn) cv. Calcutta.** *Indian Food Packer* 46(3); 1992: 13-15

Litchi fruit of cv. Calcutta was dipped in separate solutions of 2, 4 and 6% thiourea for 8 min; 125, 250 and 500 p.p.m. of Bavistin (methyl-2-benzimidazole carbonate) for 2 min; 1, 2 and 3% of sodium hypochlorite and 0.25, 0.5 and 1% of copper sulphate for 2 min. Among the different treatments fruits dipped in thiourea were excellent in taste and flavour even after 20 days in cold storage. The physiological loss in wt. of fruits dipped in thiourea was 1.3 to 1.4% which was 5.0% in untreated fruits. TSS was more and acidity was less in all treated fruits. Dipping in 4% thiourea solution for 8 min gave max. storage of 20 days in cold storage with best retention of colour, dessert quality and min. wt. loss. GS

## Mangoes

598

Ramteke (RS), Gurudutt (KN) and Eipeson (WE). **Studies on the changes in the volatile aroma composition of Alphonso mango pulp as affected by aroma recovery process.** *Journal of Food Science and Technology (India)* 30(1); 1993: 48-49

Aroma distillates of fresh mango pulp, obtained by vacuum distillation and by using aroma recovery unit, were analysed by GC-MS. A total of 14 components were identified in vacuum distillate, of which 10 were carbonyls, 3 alcohols and 1 hydrocarbon  $\beta$ -myrcene. Conc. of 2-methyl propan-1-al, 2-methyl propan-1-ol and myrcene were lower in aroma conc. obtained by using aroma recovery unit. AA

## Oranges

599

Usai (M), Arras (G) and Fronteddu (F). **Effects of cold storage on essential oils of peel of Thompson Navel oranges.** *Journal of Agricultural and Food Chemistry* 40(2); 1992: 271-275

Thirty-three constituents accounting for 96.64% of total volatiles of Thompson Navel orange peel oils have been identified and quantified in a single GC capillary run. The quantitation was performed using appropriate response factors and identification using pure samples and GC-MS. After identification, experiments were carried out to test qualitative and quantitative differences on essential oils of peel of Thompson Navel oranges stored under different cold-storage conditions. During storage at a constant temp. of 6°C and at a cyclic temp. of 6 days at 2°C plus 1 day at 14°C, an increase of volatile compounds (acetaldehyde, formic acid, formaldehyde, and acetic acid) and a decrease of limonene content was observed. The cold-storage trials with Thompson navel oranges showed that the minor variations in the content of essential oils were obtained using cyclic temp. storage with short cycles: 6 days at 6°C plus 1 day at 14°C and 18 days at 6°C plus 7 days at 14°C. AA

## Raisins

600

Sharma (PC), Sharma (KD) and Prashar (RS). **Prospects of raisin production in tribal areas of Himachal Pradesh.** *Indian Food Packer* 46(3); 1992: 16-19

Process and production cost of raisin by sun-drying and solar drying are discussed. Rs. 8225 and Rs. 8772 are required to produce 110 kg raisin by sun-drying and solar dehydration, respectively. A sum of Rs. 9775 and Rs. 10,650 are raised by selling the raisin at wholesale rates, indicating its technoeconomic profitability. Sun-drying is done by spreading the grape bunches in open sun on roof tops or floor using pine needles/gunny bags or mats. After 8 - 10 days drying, berries are separated from bunches, sorted and packed in gunny bags/wooden boxes. Solar dehydration improved the quality of the product and efficiency of the process. Solar dehydrator used is an enclosed rectangular box 6 x 3 x 1 cft internal dimensions, made up of wood thermocol and tin sheet. The is raised to 4 ft at one end. Top is covered with a glass sheet and inner sides are painted black. Air inlet and outlet are provided at the lower and upper ends respectively. GS



## Strawberries

601

Lee (YC) and Lee (SH). **Flavour quality of concentrated strawberry pulp with aroma recovery.** *Journal of Food Quality* 15(5); 1992: 321-332

The serum portion of strawberry pulp separated by centrifugation at 9000 g for 5 min was conc. 5-folds at 55 - 58°C and 30 - 40 mm Hg with aroma recovery. The conc. serum, aroma fraction and insoluble pulp were mixed to make 2-fold conc. strawberry pulp. Significant improvement in flavour quality of conc. strawberry pulp by addition of aroma fractions was established by GC, GC/MS and sensory analyses. A 10% aroma recovery appeared to be suitable for the efficient concn. of strawberry pulp. SD

## Water melon

602

Wyllie (SG) and Leach (DN). **Sulphur-containing compounds in the aroma volatiles of melons (*Cucumis melo*).** *Journal of Agricultural and Food Chemistry* 40(2); 1992: 253-256

The incidence of 6 thioether esters, methyl (methylthio)acetate, ethyl (methylthio)acetate, 2-(methylthio)ethyl acetate, methyl 3-(methylthio)propanoate, ethyl 3-(methylthio)propanoate, and 3-(methylthio)propyl acetate, considered to be of importance to the aroma profiles of *Cucumis melo* fruit, has been surveyed in a wide range of cvs. Their presence and concn. appear to be under genetic control since there are marked differences between cvs. The concn. of these compounds have been determined in a number of cvs and some have been shown to have odour values which indicate that they contribute to the overall aroma perception of the ripe fruit. AA

## CONFECTIONERY, STARCH AND SUGAR

### Confectionery

#### Chocolates

603

Harris (NE), Segars (RA) and Robertson (MM). **Storage stability of chocolate caramel rolls.** *Manufacturing Confectioner* 72(2); 1992: 51-54

Storage of the candy at 38°C in sealed flexible barrier packs exhibited acceptable rating even when stored for 6 months at this accelerated temp. Acceptance

ratings at 6 months were 3.1 without a barrier pack and 7.0 with the barrier pack. Packaging in air packs is preferred over vacuum packaging because at 38°C under vacuum the wrapper sticks to the candy. BV

## BAKERY PRODUCTS

### Biscuits

604

Srivastava (AK) and Haridas Rao (P). **Studies on low-fat soft dough biscuits.** *Journal of Food Science and Technology (India)* 30(1); 1993: 21-24

Studies on reduction in fat from 20 to 7.5%, in soft dough biscuits, indicated decrease in spread from 5.5 to 5.15 cm and increase in hardness from 0.9 to 1.3 kg/biscuit. In addition, the overall quality score decreased from 48.5 to 30.0. Further reduction in fat adversely affected machinability of the dough. The adverse effects were considerably lower with bakery shortening as compared to other fat or oil. Lecithin at 0.5% was found to be most effective for improving the overall quality of low-fat biscuits. The crispness of low-fat biscuits could also be improved by incorporating flaked rice flour at 5% level. AA

### Bread

605

Rama (MB). **Processing stages of breadmaking.** *Indian Miller* 22(6); 1992: 15-19

The rationale behind the various steps in bread making and the conditions prevailing under each step is described. These include, sieving, preparation of yeast solution, dough mixing procedure and period of mixing, dough temp. and its calculation, changes in fermentation, knock back dough make up, panning, final proof, baking, steaming and cooling. Chemical changes occurring during these steps are described briefly. SRA

## MILK AND DAIRY PRODUCTS

606

El-Gazzar (FE) and Marth (EH). **Ultrafiltration and reverse osmosis in dairy technology: A review.** *Journal of Food Protection* 54(10); 1991: 801-809

Review covers ultrafiltration (introduction and definition), composition and characteristics of retentate derived from ultrafiltered milk (milk fat, protein, minerals, lactose, vitamins, viscosity,

texture), starter activity in ultrafiltered milk, behaviour of pathogenic bacteria in ultrafiltered milk, ultrafiltered milk for making cheese (Cottage cheese, Feta cheese, Domiati cheese, Camembert cheese, Blue cheese, Mozzarella cheese, Colby and Brick cheeses, Cheddar cheese) and other dairy foods and reverse osmosis. 68 references. BV

607

Vigo (MS), Malec (LS), Gomez (RG) and Llosa (RA). **Spectrophotometric assay using O-phthaldialdehyde for determination of reactive lysine in dairy products.** *Food Chemistry* 44(5); 1992; 363-365

The results showed that O-phthaldialdehyde procedure is reliable for use even in the presence of high levels of sugars and can evaluate lysine damage after Maillard-type reactions. SD

## Milk

608

Farah (Z), Rettenmaier (R) and Atkins (D). **Vitamin content of camel milk.** *International Journal for Vitamin and Nutrition Research* 62(1); 1992; 30-33

The milk samples collected from 20 camels (*Camelus dromedarius*) were analysed for vitamin C, vitamin B<sub>2</sub> and fat-soluble vitamins E and A content. The study showed that camel milk contained less vitamin A and B<sub>2</sub> than cow's milk. Vitamin C was higher than in cow's milk and vitamin E was same as that of cow's milk. GS

609

Pearce (RJ), Dunkerley (JA), Marshall (SC), Regester (GO) and Shanley (RM). **New dairy science and technology leads to novel milk protein products.** *CSIRO Food Research Quarterly* 51(3/4); 1991; 137-144

The importance of maintaining a continuing effort in pursuit of fundamental scientific information about milk and dairy systems for the furtherance of dairy technology is demonstrated in this paper. Aspects covered are, the thermal fractionation of whey proteins, isolation of casein-derived peptide and preparation of  $\alpha$ -lactalbumin and whey lipoproteins. 7 references. SRA

610

Lederer (CL), Bodyfelt (FW) and McDaniel (MR). **The effect of carbonation level on the sensory properties of flavoured milk beverages.** *Journal of Dairy Science* 74(7); 1991; 2100-2108

Raspberry, strawberry, peach and root beer flavoured milks were carbonated at subthreshold, low, and high carbonation levels with mean carbonation vol. of < 0.60, 0.74 and 1.42, respectively. The effect of carbonation on perceived aroma and flavour by mouth attributes was determined through evaluation by a trained panel. Panelists detected a significant difference in carbonation intensity between the high carbonation level and the subthreshold and low carbonation levels. Carbonation significantly suppressed cooked milk aroma and flavour by mouth at the low and high carbonation levels, but CO<sub>2</sub> significantly enhanced sourness and astringency at the high carbonation level. Chalkiness and bitterness were rated significantly higher at the high carbonation level than at the low subthreshold levels. AA

611

Neeser (J-R), Golliard (M) and Del Vedovo (S). **Quantitative determination of complex carbohydrates in bovine milk and in milk-based infant formulas.** *Journal of Dairy Science* 74(9); 1991; 2860-2871

Milk-based infant formulas contained complex carbohydrates in amounts similar to those found in bovine milk. In whey-based raw materials, elevated levels of all bovine milk glucoconjugates and oligosaccharides were evident. BV

612

Bastian (ED), Collinge (SK) and Ernstrom (CA). **Ultrafiltration: Partitioning of milk constituents into permeate and retentate.** *Journal of Dairy Science* 74(8); 1991; 2423-2434

Retentate and permeate samples during UF and diafiltration of unacidified and acidified whole milk were collected. After analyzing retentate and permeate, the retention and recovery of fat, total N, rennet clottable N, lactose, Ca, Na, P and riboflavin was calculated. Retention depends on the permeate:retentate ratio of components. Recovery is the component amount in retentate divided by its amount in original milk. Removing permeate from unacidified milk increased retention of total N, Ca, Na, P and riboflavin. All the fat and rennet clottable N and 1% of lactose were retained. Recovery of these components ranged from 12% for lactose to 100% for fat and rennet clottable N. Retention of lactose, Na, P and riboflavin was higher during diafiltration than during UF of unacidified milk, but recovery of total N, lactose, Ca, Na, P and riboflavin was higher. Diafiltration of acidified milk decreased retention of Ca, P, Na and riboflavin compared with diafiltration of unacidified milk. Changes in constituent retention during UF processes depend on level of concn., diafiltration and acidification. Because



diafiltration and acidification influence retention and recovery of many milk components, processors can alter pH, rennetability, syneresis, and meltability of cheese (and properties of other derived products). AA

613

Rajagopalan (N) and Cheryan (M). **Total protein isolate from milk by ultrafiltration: Factors affecting product composition.** *Journal of Dairy Science* 74(8); 1991: 2435-2439

Skim milk (prepared from reconstituted NDM) was ultrafiltered by a combination of concn. and diafiltration to produce purified total protein isolates with the desired protein:lactose ratio. The rejection of protein and lactose followed expected trends. However, rejection of ash increased to 100% toward the end of the process due to insolubility of salts or their binding to proteins. At the natural pH of skim milk, the min. ash content was 7 to 8% of the retentate solids, resulting in a limiting protein content of 90%. AA

614

Anita Bansal and Singhal (OP). **Preservation of milk samples with formalin - effect on acidity.** *Indian Journal of Dairy Science* 44(9); 1991: 573-576

The titratable acidity of milk increased with the increase in formalin level and storage period. Initial increase in acidity due to reaction of formalin with milk proteins liberating hydrogen ions and on prolonged storage further increased the acidity and has been attributed to significant increase in the proteolytic activity. Addition of formalin even at low levels completely inhibited the proliferation of any bacteria in the milk. AA

615

Taher (MM) and Lakshmaiah (N). **Folic acid stability in hydrogen peroxide-potassium thiocyanate-treated milk.** *Food Chemistry* 44(5); 1992: 343-347

616

Stewart (G), Gosselin (C) and Pandian (S). **Selected ion monitoring of tert-butyldimethylsilyl cholesterol ethers for determination of total cholesterol content in foods.** *Food Chemistry* 44(5); 1992: 377-380

A GC/MS method was applied to determine the total cholesterol in eggs and dairy products. Compared to the cholesterol estimated by colorimetric method, there was slight underestimation. The saponification and extraction procedure allowed for 98.6% recovery of spiked cholesterol in milk with a

coeff. of variation 2.1%. Even 5ng/100g food can be detected with 95% accuracy using external standards. SD

617

Shah (T), Nagabrahmam (D) and Shah (J). **A problem in milk pricing by Indian dairy co-operatives: Key issues and present policies.** *Indian Dairyman* 44(8); 1992: 384-392

The cost factor of milk covers 2 nutrients - milk fat and solids non-fat (SNF) but existing technology permits easy and rapid testing of fat alone. The implication of the 2-axis pricing formula (equivalent fat based or real) leads to under payment to buffalo milk and higher payment for cow milk and also the problem of dilution of milk supplied to the co-operatives. The problem of milk pricing being technological, two axis milk pricing formula has to wait till a feasible and easy SNF testing method is found. GS

618

Kalsi (BS). **Let's all do it - market more milk.** *Indian Dairyman* 44(8); 1992: 393-400

Indian milk marketing system viz. door delivery supply, sale to dealers/boothowners; returns to dealers; sales promotion programmes; optimisation of manpower resources; appointment of delivery agents; minimising record keeping and documentation; appointment of route supervisors for 20 booths; rationalisation of the milk distribution; fair pricing of milk with prices printed on the milk pouch; and recasting of the annual milk marketing plan are detailed. GS

### Sheep milk

619

Needa (EC). **Effects of long-term deep-freeze storage on the condition of the fat in raw sheep's milk.** *Journal of Dairy Research* 59(1); 1992: 49-55

Stability of fat in frozen and stored (-12, -20 and -27°C) raw sheep's milk from three herds showed a gradual increase in free fatty acids during 6 months storage; the rate of lipolysis being affected by storage temp. and differences between herds. After 6 months storage the residual lipase activity was 2% (-12°C), 11% (-20°C) and 24% (-27°C) of the initial activity in fresh milk. The potential for lipolysis in the stored samples, after they were removed from storage and allowed to thaw to 4°C, gradually fell as storage time was prolonged, which may be due to the loss of lipase activity. BV



## Milk products

620

Mulvihill (DM). **Trends in the production and utilisation of dairy protein products: Production.** *CSIRO Food Research Quarterly* 51(3/4): 1991: 145-157

Article describes the production of dairy protein products, production of caseins (destabilisation/precipitation), dewheyng, washing, dewatering, drying, tempering and grinding, production of caseinates (sodium caseinate, other caseinates), miscellaneous methods of casein and co-precipitate isolation, industrial scale fractionation of caseins, production of whey protein-enriched products (whey powders/modified whey powders, whey protein concentrate production by ultrafiltration diafiltration, whey protein isolate production by ion exchange adsorption, lactalbumin production, fractionation of whey proteins) and co-precipitate production and milk protein concentrate production. 16 references. SRA

## Cheese

621

Tatsumi (K), Nishiya (T), Ido (K) and Kawanishi (G). **Effects of heat treatment on the meltability of processed cheese.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 38(2): 1991: 102-106 (Ja)

"Model cheese" simply consisted of sodium caseinate, butter fat, and water was prepared in order to study effects of heat treatment on the meltability of processed cheese. When the model cheese was held at 80°C after cooking, the meltability decreased with the increase of holding time. During this process, the increase of water insoluble protein was observed with the decrease of meltability. The correlation coeff. value of -0.92 indicated significant relationship between water insoluble protein content and meltability. The formation of the insoluble protein was considered being caused by aggregation of the protein adsorbed to the surface of fat globules in the cheese held at 80°C, and associated with the decrease of meltability. AA

622

Soda (ME) and Pandian (S). **Recent developments in accelerated cheese ripening.** *Journal of Dairy Science* 74(7): 1991: 2317-2335

This review article deals with conventional strategies for cheese ripening, principally employing different

enzymes that would be added to the cheese. Also reviewed are the more recent strategies that more often involve the addition of whole bacterial cells or their total components. Aspects considered are ripening at elevated temp., addition of enzymes from sources not cheese-related (proteinases and peptidases, lipases,  $\beta$ -galactosidases), enzymes from cheese-related microorganisms, enzyme cocktails, addition of slurry systems, other additives (amino acids and autolysed yeast), attenuated bacterial cells and genetically modified starter bacteria, acceleration by enzymes entrapped in liposomes or milk fat capsules (liposomes, microencapsulation in milk fat), and accelerated ripening of cheese made by conventional methods (ultrafiltered milk, low-fat cheese). 89 references. BV

## Gouda cheese

623

Spangler (PL), Jensen (LA), Amindson (CH), Olson (NF) and Hill (CGJr). **Ultrafiltered Gouda cheese: Effects of preacidification, diafiltration, rennet, and starter concentration and time to cut.** *Journal of Dairy Science* 74(9): 1991: 2809-2819

Preacidification of cheese milk to pH 6.3 resulted in some decrease in cheese pH. Low diafiltration level led to decreased cheese ripening measured as phosphotungstic acid- and TCA-soluble N. A decreased rennet concn. was found to be optimal because a level of two-thirds of conventional cheese led to excessive bitterness. Starter (3%), based on the wt. of the retentate, gave a cheese pH and moisture more similar to conventional cheese. Increasing time between coagulation and cut did not noticeably improve texture. BV

## Jack cheese

624

Eckner (KF) and Zottola (EA). **The behaviour of selected microorganisms during the manufacture of high moisture jack cheeses from ultrafiltered milk.** *Journal of Dairy Science* 74(9): 1991: 2820-2830

Number of contaminant microbes increased at a similar rate during manufacture in all cheeses. During the 6 month ripening period, bacterial starter culture population levels remained high, psychrotrophs declined slowly, *Staphylococcus* levels remained stable, and *Salmonella* populations decreased. No *Staphylococcus enterotoxin* was detected by reverse passive latex agglutination assay. BV



## Mozzarella cheese

625

Oberg (CJ), Merrill (RK), Brown (RJ) and Richardson (GH). **Effects of milk-clotting enzymes on physical properties of Mozzarella cheese.** *Journal of Dairy Science* 75(3); 1992: 669-675

Direct acid Mozzarella cheese was made in 6-L vats using calf chymosin, bovine pepsin, porcine pepsin, or *Mucor miehei* protease. Four cheeses were made with each enzyme. Stretch, melt, cook colour (reflectance colorimeter), moisture, and pH were measured at 1, 7, 14 and 28 days. Correlation coeff. among these parameters were calculated, and the effects of choice of enzyme and storage time at 4°C on these parameters were evaluated by analysis of variance. Cook colour was not affected by enzyme type and changed only slightly during storage. Melt was affected by choice of enzyme and increased significantly with time. During the 28-days ripening period, the melt of cheese made with calf chymosin increased the most. The smallest increase in melt was in cheese made with porcine pepsin. Stretch was significantly affected by enzyme and by storage time. Stretch decreased rapidly in all cheeses between day 1 and 7 and stabilized during the next 21 days. Cheese made with porcine pepsin had the greatest stretch, and cheese made with calf chymosin had the least stretch, between day 7 and 28. Melt increased, and stretch decreased, during storage of all cheeses. The type of milk-clotting enzyme used played a significant role in determining physical properties of direct acid Mozzarella cheese. AA

## Ras cheese

626

El-Soda (MA), Hantira (AA), Ezzat (NI) and El-Shafei (HK). **Accelerated ripening of Ras cheese using freeze-shocked mutant strains of *Lactobacillus casei*.** *Food Chemistry* 44(3); 1992: 179-184

Ras cheese was manufactured with Lac<sup>-</sup> and Lac<sup>+</sup> mutant strains of *L. casei*. Cheese analysis and the organoleptic evaluation of the cheese were carried out for 6 wks. Experimental cheeses showed higher values for soluble nitrogen, total volatile acidity and free fatty acids during cheese ripening than the controls. The organoleptic evaluation indicates that, as a general rule, the Lac<sup>-</sup> mutants obtained higher scores than the controls. Results of this work show that incorporation of frozen (Lac<sup>-</sup>) strains of *L. casei* into Ras cheese as a source of enzymes could be useful for accelerating maturation, and could also serve to minimize the development of bitterness. AA

## Ghee

627

Galhotra (KK) and Wadhwa (BK). **Flavour potential of ghee-residue. Part 1. Free fatty acids and total carbonyls level.** *Indian Journal of Dairy Science* 44(9); 1991: 565-567

Ghee-residue lipids were extracted by suitably modified Mojonnier method and a newly developed single solvent (methanol) method. Methanol extraction method was more effective in extracting ghee-residue lipids along with FFA and carbonyls as flavour compounds than the Mojonnier method. The levels of FFA and total carbonyls were higher in ghee-residue than in ghee indicating that ghee-residue is a rich source of flavour compounds, namely FFA and carbonyls. AA

628

Galhotra (KK) and Wadhwa (BK). **Flavour potential of ghee-residue. Part II: Lactones level.** *Indian Journal of Dairy Science* 44(9); 1991: 568-572

The gas chromatograms of lactonic isolates of ghee-residue showed a complex profile of 47 peaks. The homologous series of n-saturated  $\delta$  and  $\gamma$ -lactones from C<sub>6</sub> - C<sub>16</sub> and C<sub>18</sub> have been characterised in ghee-residue.  $\delta$ -lactones compared to  $\gamma$ -lactones were the major components in ghee-residue.  $\delta$ -C<sub>12</sub>, C<sub>14</sub> and C<sub>18</sub> were the major lactones in ghee-residue. The study revealed that ghee-residue is a rich source of lactones. AA

## Khoa

629

Patel (RS), Gupta (VK), Singh (S) and Reuter (H). **Effect of addition of whey protein concentrate on the sensory and Instron texture profile of khoa made from cow milk.** *Journal of Food Science and Technology (India)* 30(1); 1993: 64-65

Whey protein conc. (5% solids) incorporated khoa showed improved sensory characteristics over the control cow milk khoa and compared well with the commercial one. Lower total solids content in whey protein conc. incorporated khoa was necessary to counter adverse effect of whey protein conc. on the instron texture parameters. AA

## Paneer

630

Pawan Kumar and Bector (BS). **Enhancement of shelf-life of paneer with food additives.** *Indian Journal of Dairy Science* 44(9); 1991: 577-584

The shelf-life of paneer prepared with and without addition of TBHQ was studied. Paneer stored at 5, 15 and 25°C were analysed for microbiological and chemical changes. The growth rate of microorganisms increased at higher storage temp. Increased storage time and temp. resulted increased titratable acidity, free fatty acid content and soluble N. Addition of 0.05% TBHQ and BHA, individually or in combination to paneer samples reduced the initial counts of microorganisms, and checked their growth during storage. Sensory scores of the treated paneer showed higher rate than the control samples. SRA

## Yoghurts

631

Vedamuthu (ER). **The yoghurt story - past, present and future. Part X. Dairy, Food and Environmental Sanitation** 12(6); 1992; 351-354

In this series new directions, alternate uses for yoghurt, and research needs are presented. SRA

632

Tanaka (T) and Hatanaka (K). **Application of hydrostatic pressure to yoghurt to prevent its after acidification. Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)** 39(2); 1992; 173-177 (Ja)

Since high acidity in yoghurt which occurs during its storage and delivery is unpopular among consumers, the application of hydrostatic pressure to yoghurt to prevent its after acidification (rise of acidity after packaging) was studied. Yoghurt was filled in flexible pouches and heat sealed. After applying hydrostatic pressure to the pouched yoghurt with a cold isostatic equipment MCT-150 S (Mitsubishi Heavy Industry Co.) under various pressures and temp., it was stored for 2 wks at 10°C. The acidity, the number of vital lactic acid bacteria and the texture of the yoghurt were evaluated periodically during the storage. The pressure treatment at below 200 MPa for 10 min at room temp. did not prevent the after-acidification, and the initial number of vital lactic acid bacteria was maintained for 2 wk storage. The pressure treatment at 200 - 300 MPa for 10 min at the same temp. prevented the after-acidification and maintained the initial number of vital lactic acid bacteria. By the treatment at over 300 MPa for 10 min at the same temp. after-acidification was prevented and the number of vital lactic acid bacteria was decreased as the applied pressure was increased. The texture of yoghurt was maintained regardless of the applied pressure when treatment temp. was below 20°C. Therefore, it was recognized that application of hydrostatic pressure at 200 - 300

MPa to yoghurt was effective to maintain its quality during storage and delivery. AA

## Milk proteins

633

Kneifel (W), Paquin (P), Abert (T) and Richard (J-P). **Water-holding capacity of proteins with special regard to milk proteins and methodological aspects. A review. Journal of Dairy Science** 74(7); 1991; 2027-2041

Review. 145 references. BV

634

Kitts (DD) and Yuan (YV). **Caseinophosphopeptides and calcium bioavailability. Trends in Food Science and Technology** 3(2); 1992; 31-35

Reviews the physiological significance of caseinophosphopeptides (CPP) in promoting value added products from milk protein and the role of CPP in enhancing intestinal Ca solubility which lead to bioavailability of Ca from milk. 41 references. GS

635

Kansal (VK). **Essentialities of milk proteins in human nutrition. Indian Dairyman** 44(7); 1992; 328-331

Quality of proteins from cow and human milk, nutritional quality of milk proteins and their supplementary value, dietetic value of milk proteins; milk protein allergy, immunological aspects of milk proteins; nature and types of milk enzymes are the aspects covered, review. 15 references. GS

## MEAT AND POULTRY

### Meat

636

Smith (JL). **Toxoplasma gondii in meats - a matter of concern ?. Dairy, Food and Environmental Sanitation** 12(6); 1992; 341-345

Article describes, the life cycle of *Toxoplasma gondii*, survival of *T. gondii* oocysts, distribution of *T. gondii*, nature, occurrence of *T. gondii* in foods, destruction of *T. gondii* in foods, human toxoplasmosis and economics of toxoplasmosis. SRA



Pipek (P), Sinevic (V) and Sojkova (S). **Relationship between rheological properties of coarsely minced meat and its water-holding capacity.** *Die Nahrung* 35(7): 1991: 701-704 (De)

Rheological properties of coarsely disintegrated presalted meat were studied using rotational viscometry. The close relationship between rheological properties and water-holding capacity (WHC) has been found for minced meat samples at different water additions. Time dependences of the rheological properties (yield values) have similar features as in the case of WHC. AA

638

Okonkwo (TM), Obanu (ZA) and Ledward (DA). **The stability of some intermediate moisture smoked meats during storage at 30°C and 38°C.** *Meat Science* 31(3): 1992: 248-255

## Beef

639

Gill (CO), Harrison (JCL) and Phillips (DM). **Use of a temperature function integration technique to assess the hygienic adequacy of beef carcass cooling process.** *Food Microbiology* 8(2): 1991: 83-94

640

Dickson (JS). **Attachment of *Salmonella typhimurium* and *Listeria monocytogenes* to beef tissue: Effects of inoculum level, growth temperature and bacterial culture age.** *Food Microbiology* 8(2): 1991: 143-151

641

Griffin (CL), Shackelford (SD), Stiffler (DM), Smith (GC) and Savell (JW). **Storage and display characteristics of electrically stimulated, hot-boned and nonstimulated, cold-boned beef.** *Meat Science* 31(3): 1992: 279-286

## Mutton

### Lamb

642

Brennand (CP) and Lindsay (RC). **Distribution of volatile branched-chain fatty acids in various lamb tissues.** *Meat Science* 31(4): 1992: 411-421

Volatile fatty acids (C4 - C11) including even-, odd-, and branched-chain members in lamb tissues were quantitatively analyzed. Volatile branched-chain fatty acids (BCFA) were more conc. in subcutaneous

adipose tissue samples (rump, shoulder, breast) than in perinephric adipose or muscle tissues. Perinephric adipose tissue contained relatively high quantities of n-chain, even-numbered fatty acids and very low levels of BCFA. Greater variation existed in fatty acid profiles among similar subcutaneous adipose tissues from different lambs than between samples of adipose tissue from different carcass sites from a given lamb sample. 4-Methyl- and 4-ethyloctanoic acids were present at concn. greatly above threshold levels in all lamb fats tested, and thus upon hydrolysis would contribute sp.-related flavours to lamb. 4-Methylnonanoic concn. in lamb fats ranged from nondetectable to > the threshold level, and therefore this compound would not always contribute to the sp.-related flavours of lamb. Lean meat samples contained very low concn. of 4-methyl- and 4-ethyloctanoic acids. AA

## Pork

643

Brown (T) and James (SJ). **Process design data for pork chilling.** *International Journal of Refrigeration* 15(5): 1992: 281-289

Design data collected in a survey of UK abattoirs on conventional pork-chilling systems-ultra-rapid chilling with air at -30°C; immersion chilling in brine at 0°C; ice-bank chilling in humid air at 2°C and spray chilling in 2 stages, at 10°C for 2 h followed by 4°C for 21 h are presented highlighting the problems and inadequacies. SD

644

Borisova (MA) and Oreshkin (EF). **On the water condition in pork meat.** *Meat Science* 31(3): 1992: 257-265

645

Taylor (AA) and Tantikov (MZ). **Effect of different electrical stimulation and chilling treatments on pork quality.** *Meat Science* 31(4): 1992: 381-395

## Products

### Ham

646

Kormendy (L), Zsarnoczay (G) and Mihalyi (V). **A new, modified acid phosphatase assay for determining the extent of heat treatment in canned hams.** *Food Chemistry* 44(5): 1992: 367-375

Toldra (F), Miralles (MC) and Flores (J). **Protein extractability in dry-cured ham.** *Food Chemistry* 44(5): 1992: 391-394

## Poultry

Swain (MJ), James (SJ) and Khodabandehloo (K). **The potential for robotics in poultry processing.** *Indian Food Industry* 11(3): 1992: 24-32

A feasibility study was carried out to identify the potential areas of application of robotics in poultry processing. Hanging of live birds, evisceration, grading, trussing, portioning, giblet packaging and further processing were the 7 areas identified for the application of robotic technology. The other areas of application of robotics which will require developments in computer and robotic technology before they are economically viable are the pick and place process, the robotic cell used in drumstick investigations, the vision system which enables to recognise and distinguish chicken drumsticks, mechanical transfer of drumsticks and gripper design which will operate a high speed, preferably with any non-uniform, non-rigid article while fulfilling stringent health and safety requirements. CSA

## Chickens

Sachdev (AK), Ram Gopal and Verma (SS). **Storage stability of chicken gizzard pickle.** *Indian Journal of Poultry Science* 27(4): 1992: 217-223

Data were collected from 8 trials on the quality changes of oil-based chicken gizzard pickle kept at ambient temp. for a period of 45 and 75 days in summer/rainy and winter seasons, respectively as well as under refrigerated (4 plus or minus 1°C; 80% RH) condition. In summer/rainy season (27.3°C - 34.1°C; RH 63.0 - 68.3%), the pH, shear force value (SFV) and ether extract (EE) were not significantly affected by the storage conditions and periods. However, significant decrease in moisture with increase in crude protein (CP) and TBA values was evident with the enhanced storage periods. The sensory traits were not significantly influenced by the storage conditions and periods. In winter season (16.6°C - 25.6°C; RH 16.1 - 71.2%), significant changes were observed in pH (under refrigeration only), moisture and CP. However, the SFV, EE and TBA values did not differ significantly upto 75 days of storage. Organoleptic evaluation at 75 days of storage revealed significant decline in the acceptability of product kept at ambient temp. The

total plate counts showed a general increase with the storage periods. AA

## Turkeys

Nychas (GJE) and Board (RG). **Enterotoxin B production and physicochemical changes in extracts from different turkey muscles during the growth of *Staphylococcus aureus* S-6.** *Food Microbiology* 8(2): 1991: 105-117

Enterotoxin B production during the growth of *Staph. aureus* S-6 in extracts from thigh or breast differed significantly from that of the lower leg of turkey although the extent of growth was similar in all cases. The addition of glucose or an increase in oxygen tension also affected toxin production. BV

## Products

### Eggs

Satyanarayana Reddy (L) and Sreenivas Reddy (M). **Effect of oil coating and storage condition on the quality of duck and chicken eggs.** *Indian Journal of Poultry Science* 27(4): 1992: 208-213

Duck eggs showed significantly shorter air cell height, higher albumen index, Haugh unit score and % yolk but lower % albumen as compared to chicken eggs. Oil coated refrigerated eggs maintained significantly better quality in terms of air cell height, wt. loss, albumen and yolk indices, Haugh unit scores and pH of albumen and yolk than oil-coated eggs held at ambient temp. or uncoated refrigerated eggs. As the storage period increased from 0 to 42 days, there was a significant increase in air cell height, % yolk, pH of albumen and yolk and decrease in albumen and yolk indices, Haugh unit scores, % thick albumen and inner thin albumen. GS

Panda (PC) and Sharma (DP). **Maintenance of quality of duck eggs during transportation.** *Indian Journal of Poultry Science* 27(4): 1992: 214-216

Transport trials were carried out to assess the effect of journey hazards on the internal physical quality of duck eggs using different types of filler flats, loaded in corrugated fiber board boxes. Breakage of eggs and decline in their internal quality in terms of albumen index, yolk index and Haugh unit were less when transported, using paper pulp molded filler flats in comparison to plastic filler flats. The said decline could be significantly ( $P < 0.01$ ) minimized



further by spraying the eggs with CFTRI coating oil prior to transportation. AA

## Egg powder

653

Satyanarayana (TS), Gopala Rao (KR) and Sankaran (R). **Microbial quality of whole egg powder.** *Journal of Food Science and Technology (India)* 30(1): 1993; 50-51

The applications of good manufacturing practices in the preparation of freeze-dried and foam-mat-dried whole egg powders and packing in 3 package systems resulted in obtaining a microbiologically safe and good quality product which could be stored for considerably longer periods of time. AA

## SEAFOODS

### Prawns

654

Rao (DG). **Studies on viscosity-molecular weight relationship of chitosan solutions.** *Journal of Food Science and Technology (India)* 30(1): 1993; 66-67

The viscosity of chitosan solution in 1% acetic acid various concn. (0.25 - 1.0% by wt. of chitosan) was measured by Light scattering method. The data were fitted to Mark-Houwink equation as  $\eta_i = 4.74 \times 10^{-2} (M_w)^{0.723}$  which helps evaluate the av. mol. wt. (wt. av.) of chitosan samples with a knowledge of their intrinsic viscosity. AA

655

Pradip Chakraborty. **Present status of prawn processing in India.** *Indian Food Industry* 11(3): 1992; 39-41

Brief mention is made of the export of marine products, types of frozen prawns (head-on-headless-shell on, butterfly fantail, peeled and deveined, peeled and un-deveined cooked peeled, peeled deveined and cooked), processing of prawns, cryogenic freezing and spiral freezers which consists of spiral tower, insulated tower and belt wash station. CSA

### Fish

656

Singh (BR) and Kulshrestha (SB). **Prevalence of *Shigella dysenteriae* group A type in fresh water**

**fishes and seafoods.** *Journal of Food Science and Technology (India)* 30(1): 1993; 52-53

Antibiotic sensitivity pattern of 7 *Shigella dysenteriae* group A strains, isolated from 185 fresh water fish and seafood samples, showed that chloramphenicol, norflox, ampicillin, gentamicin, streptomycin, doxacin, furadantin and ledermycin were effective in controlling *in vitro* growth. All the strains were resistant to septran, but only 3 to nalidixic acid. AA

### Sardines

657

Ababouch (L), Afilal (ME), Rhafiri (S) and Busta (FF). **Identification of histamine - producing bacteria isolated from sardine (*Sardina pilchardus*) stored in ice and at ambient temperature (25°C).** *Food Microbiology* 8(2): 1991; 127-136

55 bacterial isolates out of 568 were capable of producing detectable amounts of histamine on sardine fish infusion broth (SFIB) supplemented with histidine. 51 of the 55 isolates belong to *Enterobacteriaceae*, (35 were *Proteus* sp.) profile histamine - producing bacteria (HPB) were *Morganella morganii*, (7 isolates) *Proteus vulgaris* (2 isolates), *P. mirabilis* (1 isolate), *Providencia stuartii* (2 isolates), unidentified species of *Proteus* (2 isolates) and 4 unidentified isolates. Histamine production by 3 species of *Proteus* showed that these strains were more active at pH 5 than at pH 7, and at 25°C than at 4 or 35°C as they produced over 16  $\mu\text{mol}$  histamine  $\text{ml}^{-1}$  SFIB in 24 h. Addition of 8% NaCl to SFIB and refrigeration at 4°C effectively reduced histidine decarboxylase activity of these strains. SRA

## PROTEIN FOODS

### Infant foods

658

Chandrasekhar (U), Vasanthamani (G) and Thomas (AK). **Infant feeding and weaning practices among Irulas of Attapadi hills and Lambas of Katchuvadi hills.** *Indian Journal of Nutrition and Dietetics* 27(6): 1990; 175-180

Survey covers two tribal communities - Lambas of Katchuvadi hills (Tamilnadu State, India) and Irulas of Attapadi hills (Kerala State, India). Survey covered aspects like the background information (income, family size and others), dietary practices, infant feeding and weaning practices; nutritive value of local weaning food, and nutritional profile of mothers and infants. Results of the survey



indicated that tribals had only limited number of foods and methods of preparation. Not much difference was found in weaning practices between the two tribes. Both the tribals prepared infant foods from special type of greens available in their locality, but the method of preparation was same. Lamba's were nutritionally better than Irulas. KAR

## ALCOHOLIC AND NON-ALCOHOLIC BEVERAGES

### Alcoholic beverages

#### Beer

659

Dale (CJ) and Young (TW). **Applications of fast protein liquid chromatography (FPLC) to the analysis of the nitrogenous constituents of beer.** *Journal of the Institute of Brewing* 98(2); 1992: 117-121

The nitrogenous constituents of beer were investigated by several FPLC techniques. Size exclusion chromatography of dialysed beer material using columns of Superose 6 and Superose 12 suggested that beer polypeptide material was distributed across a wide relative molecular mass (Mr) range with discrete fractions of high Mr (Mr 300 000, Mr 500 000), Mr c60000, Mr c40 000 and relatively low Mr (Mr 5 000 - 20 000). The composition of fractions Mr > 40 000 and Mr 40 000 - 60 000 was investigated by ion exchange chromatography. Differences were detected in the elution profiles of fractions prepared from beers brewed from grists comprising 100% malt, 80% malt plus 20% torried wheat and 100% malted wheat consistent with differences in the polypeptide composition of these fractions. The Superose 12 column, although designed for the fractionation of high mol. wt. components, also provided a method of fractionating low mol. wt. nitrogenous materials directly from beer (for example fractions containing purine nucleosides). Reverse phase chromatography was employed in the analysis of beer peptides and demonstrated the complex composition of beer peptide fractions. AA

660

Dale (CJ) and Young (TW). **Low molecular weight nitrogenous compounds and their influence on the stability of beer foam.** *Journal of the Institute of Brewing* 98(2); 1992: 123-127

Addition of low mol. wt. nitrogenous components, nucleoside (adenosine), nucleotide (AMP) amino acids (glutamic acid, glycine, proline and asparagine) and tripeptide (glycylglycylglycine) had

no effect on the head retention value of beer. Under such conditions of artificial manipulation of the content of low mol. wt. beer nitrogenous components no correlation between the nitrogen mol. wt. ratio of beer and beer head retention value was observed. Collapsed beer foam was collected and separated into soluble and precipitated fractions. Analysis of collapsed beer foam demonstrated that high mol. wt. polypeptide material and isomerised  $\alpha$  acids are conc. in beer foam and are constituents of beer foam precipitate material. Beer foam precipitate material may be stabilised by ionic interactions between polypeptide material and isomerised  $\alpha$  acids. further analysis of beer and collapsed beer foam demonstrated that purine nucleosides are not conc. in beer foam. Similarly, under condition simulating beer dispense, amino acids are not conc. in beer foam. Under strongly selective foaming conditions, such as those encountered in a foam tower, the hydrophobic amino acids, valine, isoleucine, leucine and phenylalanine are conc. in beer foam. AA

661

Kruger (L), Pickerell (ATW) and Axcell (B). **The sensitivity of different brewing yeast strains to carbon dioxide inhibition: Fermentation and production of flavour-active volatile compounds.** *Journal of the Institute of Brewing* 98(2); 1992: 133-138

The sensitivity of brewing yeast strains, with different oxygen demands, to carbon dioxide inhibition was investigated. Lab. fermentations were performed with, and without, protein-based "yeast foods" to lower dissolved CO<sub>2</sub> during fermentation. Differences were observed in yeast fermentative performance in the presence and absence of "yeast foods" for all yeast strains tested. Fermentation performance was improved with addition of "yeast foods". There was improved carbohydrate utilisation and amino acid uptake, while acetaldehyde levels at the end of fermentation were decreased. There was an increase in fusel oil production and acetate ester levels at the end of fermentation. Sulphur dioxide levels at the end of fermentation were unaffected by "yeast food" addition. Different yeast strains displayed differing sensitivity to CO<sub>2</sub> inhibition for all parameters tested. Sensitivity to CO<sub>2</sub> was not found to be related to oxygen demand of the yeast strains. AA

#### Wines

662

Lopez (A) and Secanell (P). **A simple mathematical empirical model for estimating the rate of heat generation during formation in white-wine making.** *International Journal of Refrigeration* 15(5); 1992: 276-280



The model obtained has been verified in fermentation at different temp. of Macabeo and Chardonnay musts with different states of maturity. By using a pilot fermentation plant, the musts were fermented to an industrial level at controlled temp. in 75 l stainless-steel vessels. SD

## Non-alcoholic beverages

### Coffee whitener

663

Gruetzmacher (TJ) and Bradley (RLJr). **Acid whey as a replacement for sodium caseinate in spray-dried coffee whiteners.** *Journal of Dairy Science* 74(9): 1991: 2838-2849

Demineralized acid whey protein is an acceptable replacement for sodium caseinate in spray-dried coffee whiteners and can replace sodium caseinate at a 1:2 ratio. BV

### Fruit juices

#### Apple juices

664

Bayindirli (L). **Mathematical analysis of variation of density and viscosity of apple juice with temperature and concentration.** *Journal of Food Processing Preservation* 16(1): 1992: 23-28

The multiparameter model derived using density, viscosity of apple juice at different sugar concn. and temp. satisfactorily represented their variations in the ranges 14 - 39°Brix, 20 - 80°C respectively. SD

#### Blackcurrant juices

665

Ibarz (A), Pagan (J) and Miguelsanz (R). **Rheology of clarified fruit juices. II: Blackcurrant juices.** *Journal of Food Engineering* 15(1): 1992: 63-73

The rheological behaviour of depectinized blackcurrant juice was measured at a wide range of temp. (5 - 60°C) and concn. (35 - 64.5°Brix), using a concentric viscometer. The results indicated that depectinized clarified blackcurrant juice behaves as a Newtonian fluid. The effect of the temp. can be described by an Arrhenius-type equation. The activation energy for viscous flow was in the range 4.55 - 10.57 kcal/g mol. depending on the concn. The effect of concn. can be described by 2 types of equation, power-law and exponential. Finally, an equation for the dependence of dynamic viscosity on

temp. and  $a_w$  was developed:  $\eta = 2.13 \times 10^{-5} (a_w)^{-17.6} \exp(3380/T)$ . AA

### Peach juices

666

Ibarz (A), Gonzalez (C), Esplugas (S) and Vicente (M). **Rheology of clarified fruit juices. I: Peach juices.** *Journal of Food Engineering* 15(1): 1992: 49-61

In this work, the rheological behaviour of clarified and depectinated peach juice is studied. Peach juices free of pectin and pulp behave as Newtonian fluids. The effect of temp. and concn. on the viscosity of these juices is examined. The temp. effect was studied at 10 different temp. between 5 and 60°C. Finally, an equation describing the combined effect of temp. and concn. on the viscosity is given. AA

### Tea

667

Suematsu (S), Hisanobu (Y), Saigo (H), Matsuda (R), Hara (K), Komatsu (Y). **Studies on preservation of constituents in canned drinks. Part I. Effects of pH on stability of constituents in canned tea drinks.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 39(2): 1992: 178-182 (Ja)

In order to establish suitable production conditions of canned tea drinks, first of all, caffeine, catechins and L-ascorbic acid in commercial canned tea drinks were quantitatively determined as indicative substances of quality change by HPLC and colorimetric analysis. Secondly, canned green tea drink was prepared as a trial to examine the influence of pH of extraction media and of heat processing on the stability of caffeine, catechins and L-ascorbic acid. From the analysis of various kinds of commercial canned tea drinks including oolong tea, black tea and green tea, it was found that the concn. of caffeine and catechins in commercial canned tea drinks were 1/2 - 2/3 of those in normal tea infusion. The drinks kept at lower pH had higher retention of catechins. From the test production of canned green tea, it was found that, (1) catechins were less stable than caffeine in heat processing, (2) L-ascorbic acid was considerably stable in heat processing, (3) most catechins decreased by heat processing but (+)-catechin was remarkably increased, (4) the increase of (+)-catechin was possibly caused by isomerization of (-)-epicatechin, (5) the isomerization of (-)-epicatechin was remarkably depressed in slightly acidic extraction media containing citric acid. In conclusion, the most dominant factor affecting the stability of



catechins in tea drinks was pH of extraction media. AA

668

Kubo (I), Murol (H) and Himejima (M). **Antimicrobial activity of green tea flavour components and their combination effects.** *Journal of Agricultural and Food Chemistry* 40(2): 1992: 245-248

The antimicrobial activity of the 10 most abundant volatile components of green tea flavour (1 - 10) was examined. The activity of each volatile was moderate but broad in spectrum. Most of the volatiles tested inhibited the growth of one of the most important cariogenic bacteria, *Streptococcus mutans*. Among them, nerolidol (4) was the most potent; linolool (1) was the least effective. In addition, indole (7) significantly enhanced the activity of  $\delta$ -cadinene (2) and caryophyllene (10) against *Str. mutans*. These two sesquiterpene hydrocarbons also showed potent activity against a dermatomycotic bacterium, *Propionibacterium acnes*. Lastly, but most importantly, indole inhibited the growth of all of the Gram-negative bacteria tested, *Pseudomonas aeruginosa*, *Enterobacter aerogenes*, and *Escherichia coli*. AA

#### FATS AND OILS

669

Duthie (IF) and Barlow (SM). **Dietary lipids exemplified by fish oils and their n-3 fatty acids.** *Food Science and Technology Today* 6(1): 1992: 20-36

Presents a general view of dietary lipid in terms of early history and trends since the 1900's and current patterns of lipid usage and content, safety of dietary lipid under the following headings: association with cardiovascular disease, the recent interest in n-3 fatty acids and health, potentially unsafe components of edible oils and their assessment. BV

670

Engst (W), Petrizika (M) and Macholz (R). **Analysis of fatty acid composition of biomass lipids.** *Die Nahrung* 35(7): 1991: 695-700 (De)

The fatty acid composition of lipids produced by different bacteria, yeasts and algae are determined by capillary GC-MS. The microbial lipids are characterized by very complex fatty acid fractions including hydroxylated, cyclic or odd numbered acids (up to 50% in "Alkane-yeasts") whereas the analyzed algae and plant fatty acids are different from the typical food lipids only in their quantitative

ratio. Up to 30% arachidonic and 60% linoleic acid were detected in *Porphyridium cruentum* and *Wolffia arrhiza*, respectively. AA

#### Oils

671

Miyagawa (K), Hirai (K) and Takezoe (R). **Tocopherol and fluorescence levels in deep-frying oil and their measurement for oil assessment.** *Journal of the American Oil Chemist's Society* 68(3): 1991: 163-166

This study examined how tocopherol retention is affected by the presence or absence of food coatings, and also tested the measurement of fluorescent substance levels in cooking oil to evaluate oil deterioration. Potato slices were tempura-fried (with a coating) or french-fried (without a coating). The 3 tocopherol isomers decreased with heating time, and better retention was found in the tempura process. The decomposition rates of tocopherol were in the order  $\gamma$ - >  $\delta$  greater than or equal to  $\alpha$  for the 3 isomers for both processes over repeated fryings. The fluorescence of frying oil increased 15- and 17-fold after tempura- and french-frying, respectively, for 32 consecutive times. Changes in the amounts of tocopherol and the fluorescence correlated well with the changes found by the chemiluminescent intensity and 5 conventional methods of oil quality measurement. These results indicated that tocopherol retention is affected by the food coating, and that measurements of vitamin E loss and fluorescence increase in oil should be useful for assessing the progressive deterioration of frying oil with its repeated usage. AA

672

Elliott (JM) and Parkin (KL). **Lipase-mediated acyl-exchange reactions with butter oil in anhydrous media.** *Journal of the American Oil Chemist's Society* 68(3): 1991: 171-175

Conditions optimum for porcine pancreatic lipase catalyzed acyl-exchange reactions between a free fatty acid (FFA), undecanoic acid, and butter oil in anhydrous media were established. No solvent was required for reaction, indicating that butter oil could act as dispersant as well as substrate in reactive mixtures. Optimum temp. and pH for the reaction were 70°C and 6.5 to 7.0 respectively. The addition of up to 550 mM water to reactive mixtures had little influence on the initial rates of acyl-exchange, but shifted the reaction equilibrium to favour net hydrolysis. Optimal FFA concn. for acyl-exchange was 250 mM in terms of initial rates, and substrate inhibition by FFA was apparent at levels up to 1000 mM. In terms of % reaction yield and absolute reaction yield after 18 h, 50 mM and 250 mM FFA,



respectively, were optimum. Initial reaction rates for acyl-exchange between two model triacylglycerides indicated that esterified fatty acids were better substrates than FFA under the conditions evaluated. AA

673

Tariq Saeed (M), Agarwal (R), Khan (MWY), Ahmad (F), Osman (SM), Akihisa (T), Suzuki (K), Matsumoto (T). **Unsaponifiable lipid constituents of ten Indian seed oils.** *Journal of the American Oil Chemist's Society* 68(3): 1991: 193-197

The unsaponifiable lipid constituents, hydrocarbons, triterpene alcohols and sterols of 10 seed oils (*Catharanthus roseus*, *Nymphaea nelumbo*, *Casuarina equisetifolia*, *Lagerstroemia therolli*, *Prosopis juliflora*, *Mimusops elengi*, *M. hexandra*, *Pongamia pinnata*, *Acrocarpus fraxinifolius*, and *Bauhinia retusa*) were investigated by GLC. Total unsaponifiables ran from 4 - 14%. Some of the seed oils contained large quantities of  $\beta$ -amyrin,  $\alpha$ -amyrin and cycloartenol. *Acrocarpus fraxinifolius* was found to contain 84% of lupeol. Stigmasterol (24-ethyl-22 $\epsilon$ -dehydrocholesterol),  $\beta$ -sitosterol (24-ethyl-cholesterol) and campesterol (24-methyl-cholesterol) were common constituents in all the seed oils. Besides these constituents, tirucallol, taraxerol,  $\Psi$ -taraxasterol, fucosterol, isofucosterol, avenasterol and cholesterol also were detected in small quantities. AA

674

Boki (K), Kubo (M), Kawasaki (N) and Mori (H). **Adsorption isotherms of pigments from alkali-refined vegetable oils with clay minerals.** *Journal of the American Oil Chemist's Society* 69(4): 1992: 372-378

This study reports the applicability of the Langmuir and Freundlich equations for adsorption of pigments from these alkali-refined vegetable oils (rapeseed, soybean, wheatgerm, safflower, corn, cottonseed and sunflower) with montmorillonite, sepiolite and standard activated clay. In addition, the isosteric heat of adsorption of pigments on sepiolite and standard activated clay was calculated from a Clausius-Clapeyron equation to the adsorption isotherms from rapeseed and soybean oils at 70, 90 and 110°C. BV

#### Palm oils

675

Goh (EM) and Ker (TH). **Relationship between slip melting point and pulsed NMR data of palm kernel oil.** *Journal of the American Oil Chemist's Society* 68(3): 1991: 144-146

A quantitative relationship between slip melting point (SMP) of palm kernel oil and pulsed nuclear magnetic resonance (NMR) data was established. Regression analysis on the SMP and solid fat content (SFC) data by NMR afforded the following relationship:  $SMP(^{\circ}C) = 0.03278 \times (SFC\ 10) + 0.1458 \times (SFC\ 20) + 19.1738$  where SFC 10 was the solid fat content (%) at 10°C and SFC 20 was the solid fat content (%) at 20°C. The coeff. of multiple correlation was 0.87871. The equation was tested with 12 samples of crude and refined palm kernel oil. SMPs as determined indirectly by NMR correlated well with the conventional open capillary tube results ( $r = 0.99998$ ). The max. difference observed was 0.3 C. The correlation can be applied usefully for quality control. AA

#### Rapeseed oils

676

Benjelloun (B), Talou (T), Delmas (M) and Gaset (A). **Oxidation of rapeseed oil: Effect of metal traces.** *Journal of the American Oil Chemist's Society* 68(3): 1991: 210-211

The presence of Fe (6.2%) and Cu (93.8%) in rapeseed oil could have a effect on oil oxidation. Metal traces increase formation rate of peroxides and catalyse reactions between unsaturated fatty acids and oxygen. BV

#### Soybean oils

677

Simpson (TD). **Phospholipase D activity in hexane.** *Journal of the American Oil Chemist's Society* 68(3): 1991: 176-178

Phospholipase D converts phosphatidylcholine (PC) to phosphatidic acid (PA) at 65°C in water-saturated hexane. Presumably, the active site of the enzyme remains hydrated in the interior of a lipid micelle. Enzyme activity at elevated temp. in a nonaqueous medium contrasts sharply with inactivation at high temp. in aqueous solution. Results demonstrate that nonhydratable phospholipids can be produced enzymatically under conditions comparable to those during oil extraction in commercial soybean processing. AA

678

Habile (M), Barlow (PJ) and Hole (M). **Adsorptive bleaching of soybean oil with non-montmorillonite Zambian clays.** *Journal of the American Oil Chemist's Society* 69(4): 1992: 379-383



As an alternative to montmorillonite clay (MC), 3 local Zambian clays have been used to bleach soybean oil. The bleaching action of the natural clays was poor when compared with commercial acid-activated MC and activated charcoal (AC) adsorbents. However, acid-activation of the Zambian clays profoundly increased their adsorptive activity. Reduction of 88% in soybean oil colour (Lovibond Red) by each of the 3 Zambian clay samples represented an efficiency close to that of MC (94%) and better than AC (63%). Peroxide value (PV) of the oil was reduced by 85% (MC) and 78% (AC) while 68% was the highest reduction for the activated Zambian clays. After 12 wk of storage at ambient temp., the bleached soybean oil samples showed some oxidation. Consideration of the totox values indicated that the Zambian clay-bleached oil was more stable over this length of storage when compared with the MC bleached oil. The bleaching action shown by Al-exchanged clays was closely related to their acid-activated counterparts. These results demonstrate a dependency of adsorptive bleaching with Zambian clays on proton availability. Comparative powder X-ray diffraction analysis of the clays showed that quartz was the major mineral present, followed by kaolinite. No MC was detected. It was concluded that by appropriate treatment to generate Bronsted acidity (protons), Zambian clays can be converted into potent adsorbents for soybean oil impurities. AA

679

Rusnac (LM), Floarea (O) and Vladea (RV). **Continuous hydrogenation of vegetable oils in reactors equipped with static mixers.** *Journal of the American Oil Chemist's Society* 69(4): 1992: 384-386

Continuous hydrogenation of industrially refined soybean oil with Harshaw Ni catalyst was achieved in the slurry column equipped with Sulzer SMV motionless mixers. The influence of the operating parameters (temp., pressure, catalyst concn. and gas velocity) was investigated. BV

## SPICES AND CONDIMENTS

### Papads

680

Bhagirathi (L), Urooj (A) and Puttaraj (S). **Utilization of cowpea in the preparation of papad.** *Journal of Food Quality* 15(5): 1992: 349-355

Dough making, rolling properties and physical appearance of cowpea papad were similar to blackgram papad. Proximate composition of cowpea and blackgram papads was also similar.

Trained and untrained panels rated the quality of the cowpea papad higher. Varietal differences of cowpea did not affect the quality characteristics of the papad. Cowpea flour with all the desirable functional properties for making papads forms an excellent raw material for the papad industry. SD

## SENSORY EVALUATION

681

Rao (MA). **Role of rheology in flow of fluid and semi-solid foods.** *Indian Food Industry* 10(6): 1991: 47-53

Non-Newtonian fluid foods and the specific rheological models that have been employed in studies related to flow of fluid foods is considered in this article. Aspects covered are the flow behaviour of foods and rheological models (flow models, effect of temp. on flow behaviour), isothermal flow in tubes (flow regimes, velocity profiles and volumetric flow rate-pressure drop relationships, calculation of friction losses for power-law fluids). CSA

682

O'Mahony (M). **Understanding discrimination tests: A user-friendly treatment of response bias, rating and ranking R-index tests and their relationship to signal detection.** *Journal of Sensory Studies* 7(1): 1992: 1-47

The two strategies for dealing with the response bias central to sensory difference testing (the forced choice methods (duo-trio/triangle tests) and the use of signal detection method (d-prime, proportion of area under Receiver Operating Characteristic, R-index) are explained and discussed. The relationship between R-index values obtained by rating and ranking is attempted. SD

683

Srivastav (PP), Das (H) and Prasad (S). **Sensory optimization of process variables for preparing roasted grain powders.** *Journal of Sensory Studies* 7(1): 1992: 49-56

The sensory optimization for the quality of grain powders (Bengalgram, maize and soybean) standardized in the first phase were initial moisture content 12 plus or minus 0.2%, grain-to-sand ratio 1:4 and in the second phase sand temp. 215°C and roasting time 1.5 - 2.0 min. Sand temp. greatly affected the overall quality of the roasted grain powders followed by roasting time. SD



Ishii (R), Vie (A) and O'Mahony (M). **Sensory difference testing. Ranking R-indices are greater than rating R-indices.** *Journal of Sensory Studies* 7(1): 1992: 57-61

R-index measures obtained by rating and by ranking were compared using a model system. The prediction that R-indices obtained by ranking should exceed values obtained by rating was confirmed for both ranking computations: R(Jacob Brown) and R(Matrix). AA

685

Malundo (TMM) and Resurrection (AVA). **A comparison of performance of panels selected using analysis of variance and cluster analysis.** *Journal of Sensory Studies* 7(1): 1992: 63-75

Ten panelists evaluated 2 coffee whiteners on 14 sensory attributes using 150 mm unstructured descriptive line scale. Factor analysis indicated that 5 factors were adequate to model the data. The reliability coeff. (omega) for the sensory ballot was 0.93. One-way analysis of variance and cluster analysis gave two different groups of 9 panelists. Means and standard deviations of the scores indicated greater variability among panel ratings with one way ANOVA than cluster analysis. SD

686

Roy (G). **Bitterness: Reduction and inhibition.** *Trends in Food Science and Technology* 3(4): 1992: 85-91

This review article examines the newer developments in food products with improved palatability, the prospects for bitterness reduction in foods, and the possibility of designing novel bitterness inhibitors. Topics covered include: approaches to bitterness reduction (processing, addition of artificial sweeteners, flavours, other bitter and sour or astringent compounds, use of miscellaneous potential food additives); specific problem areas and strategies for bitterness reduction in beverages, carbohydrate products and proteins and protein foods; correlations between models of sweetness and bitterness perception; and the search for a 'universal' bitterness inhibitor. 69 references. BV

687

Drewnowski (A). **Food preferences and the opioid peptide system.** *Trends in Food Science and Technology* 3(4): 1992: 97-99

Recent studies suggests that infusions of opioid antagonist naloxone reduces taste preferences for

sugar-fat mixtures and decreases the consumption of sweet- and high-fat foods, particularly among women. GS

## FOOD STORAGE

688

Ahmed (SG). **Design of a community grain storage complex-cum-processing centre for rural area.** *Bulletin of Grain Technology* 29(1): 1991: 22-30

A model storage complex with 135 t annual capacity and a conceptional design of processing centre was developed for storage requirement and post-harvest processing. Different size bins grouped together to form rings served as community storage complex for different commodities, extending also services like drying, cleaning, grading and processing of wheat flour making, rice/maize shelling, groundnut decortication, oil expulsion, spice grinding, dhal making, besan making, etc. and retailing of seeds, insecticides, fertilizers and farm implements. GS

## INFESTATION CONTROL AND PESTICIDES

689

Bedi (SS) and Singh (M). **Susceptibility of gram Dhora towards gamma radiations (*Callosobruchus chinensis* Linnaeus).** *Bulletin of Grain Technology* 29(1): 1991: 55-56

Adult *C. chinensis* Linnaeus (gram dhora) were exposed for 1 - 7 h at different distances using  $Am^{241}$   $\gamma$ -radiation. At 1 h exposure time the after effect was not significant at 5% level, but for longer exposures the effect was significant at the above level. GS

690

Gupta (A), Gupta (SK) and Banerjee (S). **A report on mites infesting stored grains in West Bengal.** *Bulletin of Grain Technology* 29(1): 1991: 47-49

Samples of stored wheat and rice collected from 3 granaries of Calcutta, Kalyani and Nadia district of West Bengal were tested for mites infestation. Among the 25 sp., the occurrence of 4 sp. viz *Cheyletus malayensis*, *Raphignathus* sp., *Pronematus fleschneri* and *Kleemanla plumosus* were found infesting stored grains for the first time in India. The sp. *Tyrophagus putrescentiae*, *C. eruditus* and *Fuscuropoda marginata* were most common and found in samples from all the 3 localities. The other predominant sp. were *K. bengalensis* and *Leiodynychus krameri*. Among the grains, the stored wheat was more susceptible to mite attack than rice. BV



691

Singh (RB), Sircar (AR), Singh (RG), Mani (UV), Seth (J), Laxmi Devi. **Dietary modulators of lipid metabolism in the Indian diet-heart study (I.D.H.S.).** *International Journal for Vitamin and Nutrition Research* 62(1): 1992: 73-82

A diet with 27.5% energy from total fat including 10.1% energy from monounsaturated fatty acids, P:S ratio 1.38, 120 mg dietary cholesterol, 26.0 g dietary fibre per 1000 kcal is capable of modulating the lipid metabolism resulting in a significant reduction in serum total cholesterol, low density lipoprotein cholesterol and triglyceride with no reduction in high density lipoprotein cholesterol. GS

692

Sargeant (H). **The glycaemic index of foods - a review.** *Food Science and Technology Today* 5(4): 1991: 218-220

The blood glucose response differs from one food to the other, although the amount of carbohydrate is the same. This difference in glycaemic response is termed as 'glycaemic index of foods'. The reasons for the difference and variation in digestibility such as processing methods, interaction with other food components, nature of starch and dietary fibre are reviewed. 28 references. GS

693

Bleyl (DWR). **Study on dietary fibre. Effects on colon carcinogenesis.** *Die Nahrung* 35(7): 1991: 767-781 (De)

694

Virupaksha (HS), Nirmala (V) and Joseph (PK). **Biochemical effects of diallyl disulphide in ethanol fed rats.** *Journal of Food Science and Technology (India)* 30(1): 1993: 33-35

Rats fed with ethanol and high lipid diet (HLD) exhibited higher levels of triacylglycerols, total cholesterol and total lipids in the serum and liver, as well as lower serum albumin and higher levels of  $\alpha$ - and  $\gamma$ -globulins. When different doses of diallyl disulphide (DASD) were fed along with ethanol to HLD fed rats, all the above lipid levels were reduced. The optimum dose of DASD for producing the hypolipidemic effects appears to be 0.66 mg/100 g body wt., when there was also an improvement in the serum albumin and  $\alpha$ -globulin levels. AA

695

Moulliswar (P), Kurien (S), Daniel (VA), Malleshi (NG) and Venkat Rao (S). **In vitro digestibility of protein and starch of energy food and its bulk reduction.** *Journal of Food Science and Technology (India)* 30(1): 1993: 36-39

Energy food had an apparent viscosity of 35,200 centipoise units (cpu) at 25% slurry concn. and this decreased at 260 cpu when it was blended with 10% malted wheat and cooked. Toasting of various ingredients such as wheat or maize, Bengalgram or peanut cake, did not have any marked effect on reducing apparent viscosity of energy food. *In vitro* protein and starch digestibility of energy food were 80 and 98% respectively. AA

696

Dave (RI), Joshi (NS), Patel (JR) and Thakar (PN). **Protein hydrolysates - a review.** *Indian Journal of Dairy Science* 44(9): 1991: 557-564

Covers history, flavour, manufacturing process (acid hydrolysis, enzymes, alkali) for protein hydrolysates, uses of protein hydrolysates (foodstuffs, noodles, cheeses, bacterial assay media, nutritional and therapeutic purposes, modified products of protein hydrolysate and plasteins). Review. 76 references. BV

697

Muscholik (G). **Proteins as multifunctional additives in dietetic foods.** *Ernährungsforschung* 36(5): 1991: 147-152 (De)

698

Petzke (KJ), Kozlovskaja (SG), Grigorov (JG) and Albrecht (V). **On the problem of nutrition and longevity: Antioxidants.** *Ernährungsforschung* 36(5): 1991: 153-156 (De)

The possible significance of different antioxidants for life span and the processes of aging was discussed. This include naturally available antioxidants from normal food or artificial ones added to experimental diets. It appears to be relatively plausible to conclude on the base of the free radical theory of aging that antioxidants may moderate age dependent pathologies reducing free radical damages. Numerous experimental results demonstrated, but not free of contradictions, the advantageous role of antioxidants. It is suggested that life span limiting processes may be inhibited by any dietary means considering the antioxidative nature of substances or reducing the risk for free radical damage, e.g. increased uptake of natural antioxidants by specific modifications of diets, or by



specific supplementation with artificial antioxidants. AA

699

Petzke (KJ), Medovar (BJ), Grigorov (JG) and Albrecht (V). **On the problem of nutrition and longevity: The role of dietary protein.** *Ernährungsforschung* 36(6): 1991; 185-188 (De)

It remains problematical to evaluate the importance of a modified dietary protein intake (amount and source of dietary proteins) for life span and the processes of aging. Irrespective of contradictory experimental results it was suggested that an adequate protein intake which considers the possible requirements of the organism for dietary protein may be more favourable for longevity and age dependent diseases than an elevated protein intake. Furthermore, it seems reasonable that a diet based preferably on vegetable protein sources may be

advantageous. This may be at least partly due to differences in amino acid composition of such proteins. AA

## TOXICOLOGY

Nil

## FOOD LAWS AND REGULATIONS

700

Jukes (DJ). **Making food irradiation legal - past, present and future.** *Food Science and Technology Today* 5(4): 1991; 211-217





# AUTHOR INDEX

- Ababouch (L)  
657
- Abert (T)  
633
- Adams (ET)  
569
- Afilal (ME)  
657
- Agarwal (R)  
673
- Agnihotri (NP)  
550
- Ahluwalia (AS)  
536
- Ahmad (F)  
673
- Ahmed (SG)  
688
- Akihisa (T)  
673
- Alaimo (LH)  
518
- Albrecht (V)  
698 699
- Almazan (AM)  
580
- Alozie (SO)  
586
- Amindson (CH)  
623
- Anders (K)  
564
- Anita Bansal  
614
- Anju Rao  
560
- Ansari (SU)  
570
- Arad (SM)  
537
- Arras (G)  
599
- Atkins (D)  
608
- Axcell (B)  
661
- Back (JP)  
530
- Baddoo (PA)  
524
- Bains (GS)  
546 589
- Baljit Singh  
548
- Bamforth (CW)  
545
- Banerjee (S)  
690
- Bansode (PC)  
578
- Barbera (R)  
521
- Bargale (PC)  
577
- Barlow (PJ)  
678
- Barlow (SM)  
669
- Barrera-Arellano (D)  
584
- Barwal (VS)  
593
- Bastian (ED)  
612
- Bayindirli (L)  
664
- Bector (BS)  
630
- Bedi (SS)  
689
- Bellion (IR)  
523
- Benjelloun (B)  
676
- Bera (MB)  
551
- Berry (SK)  
547
- Best (DJ)  
595
- Bhagirathi (L)  
680
- Bhagya Swamylingappa  
575
- Bhakare (HA)  
567
- Bhupinder (K)  
587
- Bleyle (DWR)  
693
- Board (RG)  
650
- Bodyfelt (FW)  
610
- Boki (K)  
674
- Bolin (HR)  
579
- Borisova (MA)  
644
- Borner (B)  
539
- Bourne (MC)  
563
- Boyaval (P)  
533
- Bradley (RL Jr)  
663
- Brennand (CP)  
642
- Brown (RJ)  
625
- Brown (T)  
643
- Buescher (RW)  
591
- Busta (FF)  
657
- Buyukgungor (H)  
534
- Camire (ME)  
508
- Chahal (BS)  
565
- Chandrasekhar (U)  
658
- Charjan (SKU)  
573
- Cheryan (M)  
505 613
- Chien (M)  
590
- Cho (KC)  
569
- Choudhary (PL)  
572
- Clarkson (SP)  
545
- Collar (C)  
555
- Collinge (SK)  
612
- Conforti (FD)  
556
- Corre (C)  
533
- Da Silva (IP)  
568

Dakshinamurthy (A)  
559  
Dale (CJ)  
659 660  
Daniel (VA)  
695  
Das (H)  
683  
Dave (RI)  
696  
de Alwis (AAP)  
516  
Decordt (S)  
514  
Del Valle (JM)  
563  
Del Vedovo (S)  
611  
Delmas (M)  
676  
Dickson (JS)  
640  
Dietrich (H)  
519  
Drewnowski (A)  
687  
Dua (S)  
536  
Dunkerley (JA)  
609  
Duthie (IF)  
669  
Earnshaw (R)  
531  
Ebri (A)  
555  
Eckner (KF)  
624  
Eipeson (WE)  
598  
El-Gazzar (FE)  
606  
El-Saied (H)  
540  
El-Shafei (HK)  
626  
El-Soda (MA)  
626  
Elliott (JM)  
672  
Engst (W)  
670  
Ernstrom (CA)  
612  
Esplugas (S)

666  
Esteves (W)  
584  
Ezzat (NI)  
626  
Farah (Z)  
608  
Farber (JM)  
535  
Farre (R)  
521  
Floarea (O)  
679  
Flores (J)  
647  
Francis (FJ)  
502 543  
Fransis (A)  
514  
Fronteddu (F)  
599  
Fryer (PJ)  
516  
Fujita (S)  
574  
Fukuda (M)  
582  
Fung (DYC)  
527  
Galhotra (KK)  
627 628  
Ganguly (A)  
501  
Gaset (A)  
676  
Geda (A)  
572  
Gidley (J)  
531  
Gill (CO)  
639  
Goddard (SJ)  
523  
Goh (EM)  
675  
Golliard (M)  
611  
Gomez (RG)  
607  
Gonzalez (C)  
666  
Gopala Rao (KR)  
653  
Gosselin (C)  
616

Grewal (GPS)  
597  
Griffin (CL)  
641  
Grigorov (JG)  
698 699  
Gruetzmacher (TJ)  
663  
Gupta (A)  
690  
Gupta (GK)  
594  
Gupta (SK)  
690  
Gupta (VK)  
629  
Gurudutt (KN)  
598  
Habile (M)  
678  
Hadimani (NA)  
557  
Hallberg (ML)  
581  
Hantira (AA)  
626  
Hara (K)  
667  
Haridas Rao (P)  
604  
Harinder (K)  
587  
Harish Chander  
547  
Harris (NE)  
603  
Harrison (JCL)  
639  
Hatanaka (K)  
632  
Hendrickx (M)  
514  
Hill (CGJr)  
623  
Himejima (M)  
668  
Hirai (K)  
671  
Hisaka (H)  
588  
Hisanobu (Y)  
667  
Ho (C-T)  
518 590



Hole (M)	674	Leach (DN)
678	Ker (TH)	602
Honda (N)	675	Lederer (CL)
582	Khan (MWY)	610
Hussein (AM)	673	Ledward (DA)
540	Khanna (SK)	638
Hustedt (H)	541	Lee (SH)
539	Khodabandehloo (K)	601
Ibarz (A)	648	Lee (YC)
665 666	Khotpal (RR)	601
Ido (K)	567	Leszczynska (J)
621	Kida (Y)	520
Ishii (R)	582	Lindsay (RC)
684	Kitts (DD)	642
Ito (H)	634	Lingnert (H)
528	Kneifel (W)	581
James (SJ)	633	Llosa (RA)
643 648	Komatsu (Y)	607
Jensen (LA)	667	Lopez (A)
623	Kone (K)	662
Johnson (JM)	527	Macholz (R)
556	Kormendy (L)	670
Jood (S)	646	Maciel (MI)
544	Kozlovskaja (SG)	568
Joseph (PK)	698	Madec (M-N)
694	Krishna Jha	533
Joshi (BC)	577	Maesmans (G)
552	Krishna Rao (V)	514
Joshi (NS)	561	Malec (LS)
696	Kroll (RG)	607
Judge (BK)	530	Mall (NP)
565	Kruger (L)	553
Jukes (DJ)	661	Malleshi (NG)
700	Krysteva (MA)	557 695
Junker (B)	538	Malundo (TMM)
564	Kubo (I)	685
Kalsi (BS)	668	Mani (UV)
618	Kubo (M)	691
Kansal (VK)	674	Marlatt (C)
635	Kulkarni (AS)	590
Kaplan (DI)	567	Marshall (SC)
549	Kulshrestha (SB)	609
Kapoor (AC)	656	Marth (EH)
544	Kunisada (Y)	606
Karmakar (SK)	582	Maslowska (J)
526	Kurien (S)	520
Kaul (PL)	695	Matsuda (R)
504	Lakshmaiah (N)	667
Kaur (B)	615	Matsumoto (T)
589	Lal (S)	673
Kaur (M)	552 558 578	McDaniel (MR)
536	Large (PJ)	610
Kawanishi (G)	545	Mckenna (BM)
621	Laxmi Devi	513
Kawasaki (N)	691	

Medovar (BJ)  
 699  
 Merrill (RK)  
 625  
 Mesado (D)  
 521  
 Miguelsanz (R)  
 665  
 Mihalyi (V)  
 646  
 Miralles (MC)  
 647  
 Mittra (BN)  
 549  
 Miyagawa (K)  
 671  
 Mondy (NI)  
 583  
 Mori (H)  
 674  
 Mouliswar (P)  
 695  
 Mukhopadhyay (D)  
 526  
 Mukul Das  
 541  
 Mulimani (VH)  
 566  
 Mulvihill (DM)  
 620  
 Munshi (CB)  
 583  
 Muroi (H)  
 668  
 Muschiolik (G)  
 697  
 Nagabrahmam (D)  
 617  
 Nagar (PK)  
 596  
 Nagin Chand  
 575  
 Narasimham (P)  
 592  
 Narpinder Singh  
 548  
 Nawab Ali  
 576  
 Needa (EC)  
 619  
 Neeser (J-R)  
 611  
 Nirmala (V)  
 694  
 Nishiya (T)

621  
 Nnodu (EC)  
 586  
 Nychas (GJE)  
 650  
 O'Mahony (M)  
 682 684  
 O'Neil (CA)  
 585  
 Obanu (ZA)  
 638  
 Oberg (CJ)  
 625  
 Ofuya (ZM)  
 562  
 Ogura (N)  
 588  
 Oki (Y)  
 509  
 Okonkwo (TM)  
 638  
 Oliveira (SL)  
 568  
 Olson (NF)  
 623  
 Oreshkin (EF)  
 644  
 Osman (SM)  
 673  
 Ozen (S)  
 532  
 Ozilgen (M)  
 532  
 Pagan (J)  
 665  
 Pal (RK)  
 591  
 Panda (PC)  
 652  
 Pande (HK)  
 549  
 Pandian (S)  
 616 622  
 Papamichael (N)  
 539  
 Paquin (P)  
 633  
 Paramjyothi (S)  
 566  
 Park (PSN)  
 569  
 Parkin (KL)  
 672  
 Patchett (RA)  
 530

Patel (JR)  
 696  
 Patel (PD)  
 522  
 Patel (RS)  
 629  
 Patnaik (G)  
 554  
 Pawan Kumar  
 630  
 Pearce (RJ)  
 609  
 Petrizika (M)  
 670  
 Petzke (KJ)  
 698 699  
 Phillips (DM)  
 639  
 Pickerell (ATW)  
 661  
 Pinder (AC)  
 530  
 Pipek (P)  
 637  
 Pradip Chakraborty  
 655  
 Prajapati (SK)  
 552  
 Prasad (S)  
 683  
 Prashar (RS)  
 600  
 Prieto (JA)  
 555  
 Puttaraj (S)  
 680  
 Rajagopalan (N)  
 613  
 Ram Gopal  
 649  
 Rama (MB)  
 605  
 Ramteke (RS)  
 598  
 Ramzan (M)  
 565  
 Randhawa (JS)  
 597  
 Rao (DG)  
 654  
 Rao (MA)  
 515 681  
 Ratnasudhakar (T)  
 561



<b>Regester (GO)</b>	519	Singh (S)
609	Schwartz (SJ)	597 629
<b>Resurrection (AVA)</b>	585	Singh (Y)
685	Schwedt (G)	570
<b>Rettenmaier (R)</b>	525	Singh (YP)
608	Schwenke (KD)	553
<b>Reuter (H)</b>	564	Singhal (OP)
629	Scott (KJ)	614
<b>Rhafiri (S)</b>	595	Sinha (LK)
657	Seaman (SW)	576
<b>Rhee (KC)</b>	524	Sircar (AR)
569	Secanell (P)	691
<b>Richard (J-P)</b>	662	Smith (GC)
633	Segars (RA)	641
<b>Richardson (GH)</b>	603	Smith (JL)
625	Sekhon (KS)	636
<b>Richardson (P)</b>	548	Smith (JSJr)
507	Sen (NP)	571
<b>Robertson (MM)</b>	524	Soda (ME)
603	Seth (J)	622
<b>Rosen (JD)</b>	691	Sojkova (S)
518	Shackelford (SD)	637
<b>Roy (G)</b>	641	Spangler (PL)
686	Shah (J)	623
<b>Rusnac (LM)</b>	617	Sreenivas Reddy (M)
679	Shah (T)	651
<b>Sachdev (AK)</b>	617	Sreeramamurthy (K)
649	Shanley (RM)	561
<b>Saigo (H)</b>	609	Srinivas (H)
667	Sharada (D)	575
<b>Saikia (L)</b>	583	Srivastav (PP)
546	Sharma (DP)	503 683
<b>Sajwam (KS)</b>	652	Srivastava (AK)
549	Sharma (KD)	604
<b>Sancho (MF)</b>	600	Srivastava (JL)
515	Sharma (PC)	552
<b>Sanders (TH)</b>	600	Stanley (DW)
571	Sharma (RC)	563
<b>Sankaran (R)</b>	597	Stewart (G)
653	Sharma (YK)	616
<b>Sargeant (H)</b>	572	Stiffler (DM)
692	Simpson (TD)	641
<b>Satyan (SH)</b>	677	Suematsu (S)
595	Sinevic (V)	667
<b>Satyanarayana (TS)</b>	637	Suzuki (K)
653	Singh (BR)	574 673
<b>Satyanarayana Reddy (L)</b>	656	Swain (MJ)
651	Singh (KN)	648
<b>Savell (JW)</b>	558	Taher (MM)
641	Singh (M)	615
<b>Sawarkar (NJ)</b>	689	Takezoe (R)
572	Singh (RB)	671
<b>Schneider (Ch)</b>	691	Talou (T)
564	Singh (RG)	676
<b>Schopplein (E)</b>	691	

Tanaka (T)  
632  
Tantikov (MZ)  
645  
Tarar (JL)  
573  
Tariq Saeed (M)  
673  
Tatsumi (K)  
621  
Taylor (AA)  
645  
Thakar (PN)  
696  
Thakur (VS)  
594  
Thomas (AK)  
658  
Thurnham (DI)  
542  
Tiwari (R)  
558  
Tobback (P)  
514  
Toldra (F)  
647  
Tyagi (RPS)  
578  
Uchida (M)  
582

Urooj (A)  
680  
Usai (M)  
599  
Uzogara (SG)  
562  
Varadaraj (MC)  
529  
Vasanthamani (G)  
658  
Vedamuthu (ER)  
631  
Venkat Rao (S)  
695  
Verma (SS)  
649  
Vicente (M)  
666  
Vie (A)  
684  
Vigo (MS)  
607  
Vimala (V)  
560  
Virupaksha (HS)  
694  
Vladea (RV)  
679  
Wadhwa (BK)  
627 628

Weber (D)  
524  
Wedzicha (BL)  
523  
Wurum (CM)  
583  
Wyllie (SG)  
602  
Yadav (AS)  
552  
Yadav (TD)  
550  
Yaron (A)  
537  
Yasin (MH)  
540  
Yotova (LK)  
538  
Young (TW)  
659 660  
Yuan (YV)  
634  
Zosangliana  
592  
Zottola (EA)  
624  
Zsarnoczay (G)  
646



# SUBJECT INDEX

- Acacia catechu**
  - lipid composition of Central Indian Acacia catechu 567
- Acidification**
  - Gouda cheese, preacidification effect on ultrafiltered 623
- Acidity**
  - milk, acidity in formalin preserved 614
- Additives**
  - safety/risk of non-permitted chemical additives 541
- Aging**
  - antioxidants & aging 698
- Algae**
  - red microalgae, pigments from 537
  - Scendesmus obliquus/Klebsormidium flaccidum, functional properties of green algae 536
- Analysis**
  - food analysis, lectins application in 522
- Antimicrobials**
  - tea flavour compounds, antimicrobial activity of 668
- Antioxidants**
  - aging & antioxidants 698
  - scavengers in foods & antioxidants 542
- Apple juices**
  - temp./concn. & density/viscosity analysis of apple juices 664
- Apples**
  - harvesting/handling & quality of apples 593
  - Malus domestica fruits, dodine residues in 594
- Aroma compounds**
  - Cucumis melo, aroma volatiles-S containing in 602
  - mango pulp, aroma recovery process & volatile aroma composition of Alphonso 598
- Ascorbic acid**
  - potatoes, ascorbic acid changes in stored 582
  - spinach leaves, ascorbic acid contents in stored 588
  - tea drinks, pH & L-ascorbic acid stability in canned 667
- Bacteria**
  - cytometer bacterial evaluation in cultures/foods 530
  - food pathogens, molecular methods for typing bacterial 531
  - sardines, histamine producing bacterial identification in stored 657
- Bacteriocins**
  - foods, bacteriocins in 527
- Baking**
  - wheat flour, baking quality prediction farinograph of chlorinated/unchlorinated 556
- Bananas**
  - respiration & ethylene evolution in controlled atm. stored bananas 591
  - storage temp./modified atm. & cooking of New South Wales grown bananas 595
- Barley**
  - mashing & O<sub>2</sub>-scavenging enzymes in barley 545
- Bavistin**
  - litchi cv Calcutta, Bavistin & cold storage of 597
- Beef**
  - carcass cooling process, temp. & hygienic adequacy of beef 639
  - storage/display characteristics of electrically stimulated/hot-boned/non-stimulated/cold boned beef 641
  - tissues, inoculum level/growth temp./bacterial culture age & bacterial attachment to beef 640
- Beer**
  - foam, nitrogenous compounds stability in beer 660
  - milk beverages, carbonation level & sensory properties of beer flavoured 610
  - nitrogenous constituents analysis fast protein LC of beer 659
- Beverages**
  - milk beverages, carbonation level & sensory properties of flavoured 610
- Bifidobacterium bifidum**
  - production of conc. B. bifidum 533
- Bioavailability**
  - Ca 634
- Bioconversion**
  - rice hull hemicellulose black liquor bioconversion into single-cell proteins 540
- Biomass**
  - lipids, fatty acid composition analysis of biomass 670
- Biosensors**
  - multienzyme membranes for biosensors 538
- Biscuits**
  - fat-low soft dough biscuits 604
- Bitterness**
  - reduction/inhibition of bitterness 686
- Blackcurrant juices**
  - rheological properties of blackcurrant juices 665
- Blackgram**
  - storage structures & mycoflora/viability of stored blackgram 561
- Bleaching**
  - soybean oils, clay-Zambian for bleaching 678
- Bonning**
  - storage/display characteristics of hot-boned/non-stimulated/cold boned 641
- Breadmaking**
  - processing stages of breadmaking 605
- Brinjals**
  - process improved for ready-to-eat curried brinjals 587
- Butter oils**
  - lipase-mediated acyl-exchange reactions with butter oils 672
- Cadmium**
  - diets, Cd detn. method in 521
- Caffeine**
  - tea drinks, pH & caffeine stability in canned 667
- Cajanus cajan**
  - see Red gram
- Calcium**
  - bioavailability 634
- Callosobruchus chinensis**
  - $\gamma$ -radiations & susceptibility of C. chinensis 689
- Callosobruchus maculatus**
  - wood ash/saw dust protection for C. maculatus infested greengram 565
- Calorific-value**
  - foodstuffs, caloric value detn. calorimetry/ion chromatography in 525
- Calorimetry**
  - foodstuffs, calorific value/minerals detn. calorimetry in 525
- Camel milk**
  - vitamin content in camel milk 608
- Canned foods**
  - ready-to-serve canned okra products 589

- tea drinks, pH & composition  
stability in canned 667
- Caramels**  
chocolate caramel rolls, storage  
stability of 603
- Carbohydrates**  
infant formulas, carbohydrates  
detn. in bovine-milk/milk-based  
611
- Carbonation**  
milk beverages, carbonation level  
& sensory properties of  
flavoured 610
- Carbonyls**  
ghee residues, carbonyl level in  
627
- Carcinogenesis**  
colon carcinogenesis, dietary  
fibre effect on 693
- Cardiovascular diseases**  
dietary lipids & cardiovascular  
diseases 669
- Carotenes**  
sweet potatoes,  
 $\gamma$ -irradiation &  
 $\beta$ -carotene isomerization in  
585
- Carrageenan gels**  
*Lactobacillus bulgaricus*  
stability immobilized in  
K-carrageenan gels 534
- Carrots**  
lignification retardation on  
fresh peeled carrots 579
- Carthamus tinctorius**  
see Safflower
- Caseinophosphopeptides**  
634
- Caseins**  
production of caseins 620
- Cassava**  
gari, cassava var./storage &  
quality of cassava 580
- Castor oils**  
wheat, castor oil &  
germination/damage of *Sitophilus*  
*oryzae* infested 553
- Catechins**  
tea drinks, pH & catechins  
stability in canned 667
- Cereals**  
protein/starch digestibility in  
stored/insect infested cereal  
grains 544
- Cheese**  
accelerated cheese ripening,  
developments in 622  
heat & meltability of processed  
cheese 621  
jack cheese, microorganisms &  
during manufacture of high  
moisture ultrafiltered milk  
based 624  
N-nitrosocompounds detn. in  
cheese 524
- Chemical properties**  
millets, chemical properties of  
557  
soy flour, packaging materials &  
chemical changes in stored  
full-fat 577  
soybeans, chemical properties of  
hexane extracted 575
- Cheyletus eruditus**  
grains, *C. eruditus* control in  
stored, West Bengal 690
- Chicken eggs**  
oil coating/storage conditions &  
quality of chicken eggs 651
- Chickens**  
pickles, storage stability of  
chicken gizzard 649
- Chilling**  
pork chilling, process design  
data for 643  
pork, chilling & quality of 645
- Chitosans**  
viscosity-mol. wt. relationship  
of chitosan solutions 654
- Chocolates**  
caramel rolls, storage stability  
of chocolate 603
- Cholesterol**  
tert-butyl dimethylsilyl  
cholesterol ethers for detn. of  
cholesterol 616
- Chromatography**  
foodstuffs, calorific  
value/minerals detn. ion  
chromatography in 525
- Chymosin**  
Mozzarella cheese, chymosin &  
physical properties of 625
- Chymotrypsin inhibitors**  
red gram, heat/UV & chymotrypsin  
inhibitors in 566
- Clays**  
oils, clay minerals & pigments  
adsorption from alkali-refined  
vegetable 674  
soybean oils, clay-Zambian for  
bleaching 678
- Cluster analysis**  
coffee whiteners, cluster analysis  
for 685
- Coating**  
eggs, oil coating & quality of  
duck/chicken 651
- Cobalt**  
diets, Co detn. method in 521
- Coconut water**  
*Cocos nucifera* water, storage &  
preservation of 568
- Cocos nucifera**  
see Coconut
- Coffee**  
whiteners, acid whey in  
spray-dried coffee 663
- Colon**  
carcinogenesis, dietary fibre  
effect on colon 693
- Colourants**  
new group of food colourants 543
- Concentration**  
apple juices, concn. & density  
viscosity analysis of 664
- Consumers**  
food safety, consumer-American  
perception of 502  
technology & consumer trends 501
- Containers**  
safflower seed, containers &  
storage of 573
- Cooking**  
bananas, storage temp./modified  
atm. & cooking of New South  
Wales grown 595  
rice var., cooking properties of  
Assam 546  
rice, fissured kernels & cooking  
properties of 548
- Cooling**  
beef cooling process, temp. &  
hygienic adequacy of 639
- Copper**  
diets, Cu detn. method in 521
- Corn**  
insecticide sprays in Sitoroga  
cereal/ella infested stored corn  
559  
storage losses in corn 558
- Corn oils**  
clay minerals & pigments  
adsorption from alkali-refined  
corn oils 674
- Cottonseed oils**  
clay minerals & pigments  
adsorption from alkali-refined  
cottonseed oils 674
- Cottonseed proteins**  
preparation/properties of  
glandless cottonseed 7S/11S  
protein isolates 569
- Cow milk**  
khoa, whey protein conc. &  
sensory properties/texture of  
cow-milk based 629
- Cowpeas**  
*Vigna unguiculata*  
processing/utilization of,



- review 562
- papads-cowpea based 680
- Cucumbers**
  - respiration & ethylene evolution in controlled atm. stored cucumbers 591
- Cytometer**
  - foods/cultures, cytometer bacterial evaluation in 530
- Dairy industries**
  - Listeria monocytogenes* in dairy industries 535
  - UF/reverse osmosis in dairy industries 606
- Dairy products**
  - lysine detn. spectrophotometry in dairy products 607
- Decontamination**
  - microorganisms, decontamination of 528
- Deltamethrin**
  - cereals, deltamethrin residues detn. in stored 550
- Deoiled**
  - rice bran, use of deoiled 551
- Diafiltration**
  - Gouda cheese, diafiltration effect on ultrafiltered 623
- Diallyl disulphides**
  - rats, diallyl disulphide biochemical effects in ethanol fed 694
- Dichlorvos**
  - corn, dichlorvos sprays in Sitotroga cerealella infested stored 559
- Dietary fibres**
  - colon carcinogenesis, dietary fibre effect on 693
  - millets, dietary fibres in 557
- Dietary proteins**
  - longevity & dietary proteins 699
- Dietetic foods**
  - proteins as additive in dietetic foods 697
- Diets**
  - minerals detn. in diets 521
- Digestibility**
  - in vitro digestibility of food 695
- Discrimination tests**
  - 682
- Dodines**
  - apples, dodine residues in 594
- Dried foods**
  - coffee whiteners, acid whey in spray-dried 663
- Dry beans**
  - water absorption/swelling in dry beans 563
- Duck eggs**
  - oil/coating/storage conditions & quality of duck eggs 651
  - transportation & quality of duck eggs 652
- Egg powder**
  - microbial quality of whole egg powder 653
- Eggs**
  - oil coating/storage conditions & quality of duck/chicken eggs 651
- Electrical stimulation**
  - beef, storage/display characteristics of electrically stimulated 641
  - pork, electrical stimulation & quality of 645
- Electrophoresis**
  - fababean protein isolates, characterization chem./electrophoretic of acetylated 564
- Endosulphan**
  - corn, endosulphan sprays in Sitotroga cerealella infested stored 559
- Energy foods**
  - in vitro digestibility of energy foods 695
- Enterotoxin**
  - turkey muscle extracts, Staph. aureus enterotoxin B production & physicochemical changes in 650
- Enzymes**
  - biosensors, multienzyme membranes for 538
  - pectinase preparation, polysaccharide degrading enzymes in 519
  - potatoes, enzymic activities in stored 582
- Essential oils**
  - orange peels, essential oils in cold stored Thompson Navel cold stored 599
- Ethyl alcohol**
  - diallyl disulphide biochemical effects in ethanol fed rats 694
- Export**
  - wheat/wheat products, export potential of 554
- Extraction**
  - proteins, extraction continuous aqueous phase of 539
  - supercritical gas extraction 511
  - wheat flour, lipid solid-phase extraction from 555
- Extrusion cooking**
  - protein functionality modification by extrusion cooking 508
- Fababean proteins**
  - isolates, characterization chem./electrophoretic of acetylated fababean protein 564
- Farinograph**
  - wheat flour, baking quality prediction farinograph of chlorinated/unchlorinated 556
- Fats**
  - biscuits, low-fat soft dough 604
  - soy flour, preparation of medium fat 576
- Fatty acids**
  - biomass lipids, fatty acid composition analysis of 670
  - ghee residues, fatty acids in 627
  - lamb tissues, fatty acids distribution in 642
- Fermentation**
  - volatile compounds, brewer's yeast & fermentation of flavour 661
- Fish**
  - fresh water fishes, *Shigella dysenteriae* in 656
- Flavour**
  - soybeans, flavour of hexane extracted 575
  - strawberry pulp, flavour quality of aroma recovered 601
- Flavour compounds**
  - tea flavour components, antimicrobial activity of green 668
- Flavoured foods**
  - milk beverages, carbonation level & sensory properties of flavoured 610
- Fluorescence**
  - oils, tocopherol/fluorescence levels in deep-frying 671
- Folic acid**
  - milk, folic acid stability in hydrogen peroxide-potassium thiocyanate-treated 615
- Food safety**
  - consumer-American perception of food safety 502
- Formalin**
  - milk, acidity in formalin preserved 614
- Fruits**
  - internal atm. of fruits 592
  - production of fruits, India 504
  - respiration & ethylene evolution in controlled atm. stored fruits 591
- Functional properties**
  - green algae, functional properties of 536

- Fungi**  
blackgram, storage structures & mycoflora/viability of 561
- Fungicides**  
litchi cv. Calcutta, fungicides & cold storage of 597
- Fusciropoda marginata**  
grains, *F. marginata* control in stored, West Bengal 690
- Gari**  
see Cassava
- Ghee**  
residues, fatty acids/carbonyls level in ghee 627  
residues, lactones level in ghee 628
- Gibberellic acid**  
yam tubers, sprouting control  
gibberellic acid in 586
- Glycaemic index**  
foods, glycaemic index of, review 692
- Glycosides**  
tomatoes, glycosides in 590
- Gouda cheese**  
ultrafiltration & Gouda cheese 623
- Grains**  
powders, sensory optimization of roast grain 683  
storage complex-cum processing rural centre, design of grain 688
- Grapes**  
internal atm. of grapes 592
- Greengram**  
*Callosobruchus maculatus* infested  
greengram, wood ash/saw dust protection for 565
- Groundnuts**  
insects/mites on stored  
groundnuts, Andhra Pradesh 570  
moisture content/storage system & quality/milling properties of groundnuts 571
- Hams**  
canned hams, heat treatment detn. phosphatase assay in 646  
dry-cured hams, protein extractability in 647
- Handling**  
apples, handling period & quality of 593
- Harvesting**  
apples, harvesting time & quality of 593  
kinnow fruits, harvesting periods & shelf-life/quality of 596  
rice, harvesting time & milling quality of 549
- Heat**  
cheese, heat & meltability of processed 621  
hams, heat treatment detn. phosphatase assay in canned 646  
red gram, heat & trypsin/chymotrypsin inhibitors in 566  
wine making, heat generation rate estimation in 662
- Heat exchangers**  
scraped surface heat exchangers 512
- Heat transfer**  
heterogenous foods, fluid-to-particle heat transfer coeff. detn. in 514
- Heating**  
ohmic heating process operability & electrical conductivity effects 516  
ohmic resistance heating 510
- Hexane**  
phospholipase D activity in hexane 677
- Hibiscus esculentus**  
see Okra
- Histamines**  
sardines, histamine producing bacterial identification in stored 657
- Hydrogen peroxide**  
milk, folic acid stability in hydrogen peroxide-potassium thiocyanate-treated 615
- Hydrogenation**  
soybean oils, reactors with static mixers & continuous hydrogenation of 679
- Hydrolysates**  
protein hydrolysates, review 696
- Hygiene**  
beef cooling process, temp. & hygienic adequacy of 639
- Infant feeding**  
survey of infant feeding in Irulas/Lambas 658
- Infant foods**  
infant formulas, carbohydrates detn. in bovine-milk/milk-based 611
- Insect infestation**  
cereal grains, protein/starch digestibility in stored/insect infested 544
- Insects**  
groundnuts, insects on stored, Andhra Pradesh 570  
rice products, storage insect pests in 547  
sorghum flour, infestation control in tricalcium phosphate treated stored 560
- Intermediate moisture meat**  
stability of stored intermediate moisture smoked meats 638
- Ipomoea carnea**  
wheat, *I. carnea* powders & germination/damage of *Sitophilus oryzae* infested 553
- Ipomoea tricolor**  
food colourants 543
- Iron**  
diets, Fe detn. method in 521
- Irradiation**  
food irradiation, legal aspect of 700  
sweet potatoes,  $\gamma$ -irradiation &  $\beta$ -carotene isomerization in 585
- Isopropyl N-(chlorophenyl)carbamates**  
potatoes, storage time/temp./cooking & isopropyl N-(3-chlorophenyl)carbamates in 583
- Khoa**  
whey protein conc. & sensory properties/texture of cow-milk based khoa 629
- Kinnow mandarins**  
harvesting periods & shelf-life/quality of kinnow fruits 596
- Klebsormidium flaccidum**  
see Algae
- Lactic acid**  
*L. bulgaricus*/Strep. thermophilus, substrate concn. & growth/lactic acid production by 532
- Lactobacillus bulgaricus**  
carrageenan gels, *L. bulgaricus* stability immobilized in 534  
substrate concn. & growth/lactic acid production by *L. bulgaricus*/Strep. thermophilus 532
- Lactobacillus casei**  
ras cheese, *L. casei* & accelerated ripening of 626
- Lactones**  
ghee residues, lactones level in 628
- Lambs**  
tissues, fatty acids distribution in lamb 642
- Lead**  
diets, Pb detn. method in 521
- Lectins**  
food analysis, lectins



- application in 522
- Legislation**
  - irradiation, legal aspect of food 700
- Lignification**
  - carrots, lignification
  - retardation in fresh peeled 579
- Linseed oils**
  - wheat, linseed oils & germination/damage of *Sitophilus oryzae* infested 553
- Lipases**
  - butter oils, lipase-mediated acyl exchange reactions with 672
- Lipids**
  - Acacia catechu, lipid composition of Central Indian 567
  - biomass lipids, fatty acid composition analysis of 670
  - dietary lipids & safety 669
  - food surfactants, soy lysolipids & surface activity of 574
  - metabolism, dietary modulators of lipid 691
  - oilseeds, unsaponifiable lipid constituents of Indian 673
  - potato slices, lipid oxidation in 581
  - wheat flour, lipids solid-phase extraction from 555
- Liquid chromatography**
  - beer, nitrogenous constituents analysis fast protein LC of 659
- Listeria monocytogenes**
  - beef tissues, inoculum level/growth temp./bacterial culture age & *L. monocytogenes* attachment to 640
- Listeriosis**
  - foodborne listeriosis, prevention/control of 535
- Litchi**
  - Litchi chinensis cv. Calcutta, fungicides & cold storage of 597
- Litchi chinensis**
  - see Litchi
- Longevity**
  - dietary proteins & longevity 699
- Lysines**
  - dairy products, lysine detn. spectrophotometry in 607
- Magnesium**
  - soft drinks/water, Mg(II) detn. in 520
- Malt**
  - mashing & O<sub>2</sub>-scavenging enzymes in malt 545
- Manganese**
  - diets, Mn detn. method in 521
- Mangoes**
  - Alphonso mango pulp, aroma recovery process & volatile aroma composition of 598
- Marketing**
  - milk, marketing of 618
- Mashing**
  - barley/malt, mashing & O<sub>2</sub>-scavenging enzymes in 545
- Meat**
  - stability of stored intermediate moisture smoked meats 638
  - water-holding
  - capacity/rheological properties of coarsely minced meat 637
- Meats**
  - Toxoplasma gondii in meats 636
  - smoked meats, N-nitrosocompounds detn. in 524
- Meltability**
  - cheese, heat & meltability of processed 621
- Membranes**
  - biosensors, multienzyme membranes for 538
- Metabolism**
  - lipid metabolism, dietary modulators of 691
- Metals**
  - rapeseed oils, metal traces & oxidation of 676
- Microbial quality**
  - egg powder, microbial quality of whole 653
- Microorganisms**
  - cheese, microorganisms during manufacture of high moisture ultrafiltered milk based jack 624
  - decontamination of microorganisms 528
  - soy flour, packaging materials & microbial changes in stored full-fat 577
- Microwaves**
  - food processing & microwave technology 507
- Milk**
  - acidity in formalin preserved milk 614
  - flavoured milk beverages, carbonation level & sensory properties of 610
  - folic acid stability in hydrogen peroxide-potassium thiocyanate-treated milk 615
  - marketing of milk, pricing of milk 617
  - sheep's milk, frozen storage & fat in raw 619
  - ultrafiltration & partitioning permeate/retentate in milk 612
  - ultrafiltration & protein isolate from milk 613
- Milk products**
  - UF/reverse osmosis in dairy products 606
- Millets**
  - properties/composition of millets 557
- Milling**
  - groundnuts, moisture content/storage system & milling properties 571
  - milling properties of millets 557
  - rice, harvesting time/storage condition & milling quality of 549
- Minerals**
  - foodstuffs, minerals detn. calorimetry/ion chromatography in 525
- Moisture**
  - groundnuts, moisture content & quality/milling properties of 571
- Mozzarella cheese**
  - milk-clotting enzymes & physical properties of Mozzarella cheese 625
- Muscles**
  - turkey muscle extracts, Staph. aureus enterotoxin B production & physicochemical changes in 650
- Mustard oils**
  - wheat, mustard oil & germination/damage of *Sitophilus oryzae* infested 553
- NMR**
  - palm kernel oils, slip melting point/pulsed NMR data of 675
- Neem oils**
  - wheat, neem oil & germination/damage of *Sitophilus oryzae* infested 553
- Nickel**
  - diets, Ni detn. method in 521
- Nigers**
  - var., nutritional values of niger 572
- Nitrosocompounds**
  - cheese/meat, N-nitrosocompounds detn. in 524
- Nutrients**
  - millets, nutrient composition of 557
- Nutrition**
  - longevity & nutrition 698 699
  - milk proteins & human nutrition 635
- Nutritional values**
  - niger var., nutritional values of 572

- Ohmic heating**  
electrical conductivity effects & ohmic heating process 516
- Oils**  
deep-frying oils, tocopherol/fluorescence levels in 671
- Okra**  
ready-to-serve canned okra products 589
- Onions**  
storage of onions, review 578
- Oranges**  
peel, essential oils in cold stored Thompson Navel orange 599
- Osmosis**  
reverse osmosis in dairy industries 606  
reverse osmosis in food processing 505
- Oxidation**  
potato chips, oxidative stability detn. Rancimat method in 584  
potato slices, lipid oxidation in 581  
rapeseed oils, metal traces & oxidation of 676
- Oxygen**  
barley/malt, mashing & O<sub>2</sub>-scavenging enzymes in 545
- Ozone**  
microorganisms, decontamination-ozone of 528
- Packaging materials**  
application recent developments in food packaging materials, review 509  
soy flour, packaging materials & chemical/microbial changes in stored full-fat 577
- Palm oils**  
slip melting point/pulsed NMR data of palm kernel oils 675
- Paneer**  
additives & shelf-life enhancement of paneer 630
- Papads**  
cowpea based papads 680
- Pathogens**  
foodborne pathogens, detection/evaluation methods for 529  
molecular methods for typing bacterial food pathogens 531
- Peach juices**  
rheology of clarified peach juices 666
- Peaches**  
milk beverages, carbonation level & sensory properties of peach flavoured 610
- Pearl millet**  
properties/composition of pearl millet 557
- Pectinases**  
preparation, polysaccharide degrading enzymes in pectinase 519
- Peels**  
orange peels, essential oils in cold stored Thompson Navel 599
- Pepsin**  
Mozzarella cheese, pepsin & physical properties of 625
- Peptides**  
food preferences & opioid peptide system 687
- Permeates**  
milk, ultrafiltration & partitioning permeate in 612
- Pests**  
groundnuts, pests on stored, Andhra Pradesh 570
- Phosphatases**  
hams, heat treatment detn. phosphatase assay in canned 646
- Phospholipases**  
hexane, phospholipase D activity in 677
- Phospholipids**  
soy lysophospholipids & surface activity of food surfactants 574
- Physical properties**  
millets, physical properties of 557  
products/process development, physical properties role in 513  
soybeans, physical properties of hexane extracted 575
- Pigments**  
oils, clay minerals & pigment adsorption from alkali-refined vegetable 674  
red microalgae, pigments from 537
- Pineapples**  
internal atm. of pineapples 592
- Polysaccharides**  
pectinase preparation, polysaccharide degrading enzymes in 519
- Pork**  
electrical stimulation/chilling & quality of pork 645  
process design data for pork chilling 643  
water condition in pork 644
- Potassium thiocyanate**  
milk, folic acid stability in hydrogen peroxide-potassium thiocyanate-treated 615
- Potato chips**  
oxidative stability detn. Rancimat method in potato chips 584
- Potatoes**  
ascorbic acid/enzymic activities in stored potatoes 582  
slices, lipid oxidation in potato 581  
storage time/temp./cooking & carbamates in potatoes 583
- Poultry**  
processing, robotics in poultry 648
- Prawns**  
processing of prawns, India 655
- Preservation**  
coconut water, storage & preservation of 568  
food preservation, high pressure application to 506  
milk, acidity in formalin preserved 614
- Pricing**  
milk, pricing of 617
- Process**  
brinjals, process improved for ready-to-eat curried 587  
physical properties role in products/process development 513  
pork chilling, process design data for 643
- Processed foods**  
testing in processed food sector-problems 526
- Processing**  
breadmaking, processing stages of 605  
cowpeas, processing of, reviews 562  
food processing & microwave technology 507  
food processing, high pressure application to 506  
food processing, reverse osmosis in 505  
poultry processing, robotics in 648  
prawns, processing of, India 655
- Proteases**  
Mozzarella cheese, proteases & physical properties of 625
- Proteins**  
dietetic foods, proteins as additive in 697  
extraction continuous aqueous phase of proteins 539  
extrusion cooking, protein functionality modification by 508  
hams, protein extractability in



- dry-cured 647
- hydrolysates, review 696
- in vitro digestibility of
  - proteins 695
  - volatiles, protein glycation & formation of 518
- Proteins cereal**
  - grains, protein digestibility in stored cereal 544
- Proteins milk**
  - milk protein products & dairy science/technology 609
  - milk proteins & human nutrition 635
  - production/utilization of dairy protein products 620
  - ultrafiltration & protein isolate from milk 613
  - water-holding capacity of milk proteins, review 633
- Puffing**
  - speciality foods, puffing for 503
- Pulps**
  - mango pulp, aroma recovery process & volatile aroma composition of Alphonso 598
  - strawberry pulp, flavour quality of aroma recovered 601
- Quality**
  - apples, harvesting/handling & quality of 593
  - cassava gari, cassava var./storage & quality of 580
  - eggs, oil coating/storage conditions & quality of duck/chicken 651
  - eggs, transportation & quality of duck 652
  - groundnuts, moisture content/storage system & quality of 571
  - kinnow mandarin fruits, harvesting periods & quality of 596
  - rice, harvesting time/storage condition & milling quality of 549
  - wheat, quality of rain damaged, Mathura 552
- Radiation**
  - microorganisms, decontamination-ionizing radiation of 528
- Radiations**
  - Callosobruchus chinensis*,  $\gamma$ -radiations & susceptibility of 689
- Raisins**
  - production of raisin, Himachal Pradesh 600
- Rapeseed oils**
  - clay minerals & pigments adsorption from alkali-refined rapeseed oils 674
  - metal traces & oxidation of rapeseed oils 676
- Ras cheese**
  - Lactobacillus casei* & accelerated ripening of ras cheese 626
- Raspberries**
  - milk beverages, carbonation level & sensory properties of raspberry flavoured 610
- Ready-to-eat foods**
  - brinjals, process improved for ready-to-eat curried 587
- Ready-to-serve foods**
  - okra products, ready-to-serve canned 589
- Red gram**
  - Cajanus cajan*, heat/UV & trypsin/chymotrypsin inhibitors in 566
- Rennet**
  - Gouda cheese, rennet effect on ultrafiltered 623
- Residence time distribution**
  - holding time-residence time distribution 515
- Residues**
  - cereals, deltamethrin residues detn. in stored 550
- Retentates**
  - milk, ultrafiltration & partitioning retentates in 612
- Reverse osmosis**
  - dairy industries, reverse osmosis in 606
  - food processing, reverse osmosis in 505
- Rheological properties**
  - blackcurrant juices, rheological properties of 665
  - foods, rheological properties of fluid/semi-solid 681
  - meat, water-holding capacity/rheological properties of coarsely minced 637
  - peach juices, rheology of clarified 666
- Rice**
  - deltamethrin residues detn. in stored rice 550
  - fissured kernels & cooking properties of rice 548
  - harvesting time/storage condition & milling quality of rice 549
  - insect infestation control in stored rice, West Bengal 690
  - products, storage insect pests in rice 547
  - var., properties of Assam rice 546
- Rice bran**
  - deoiled use of rice bran 551
- Rice hulls**
  - single-cell proteins, rice hull hemicellulose black liquor bioconversion into 540
- Ripening**
  - cheese ripening, developments in accelerated 622
  - ras cheese, *L. casei* & accelerated ripening of 626
- Roasted foods**
  - speciality foods, roasted blended foods as 503
- Roasting**
  - speciality foods, roasting for 503
- Rolls**
  - chocolate caramel rolls, storage stability of 603
- Safety**
  - additives, safety of non-permitted chemical additives 541
- Safflower**
  - Carthamus tinctorius* seed, containers & storage of 573
- Safflower oils**
  - clay minerals & pigments adsorption from alkali-refined safflower oils 674
- Salmonella typhimurium**
  - beef tissues, inoculum level/growth temp./bacterial culture age & *S. typhimurium* attachment to 640
- Sardina pilchardus**
  - see Sardines
- Sardines**
  - Sardina pilchardus*, histamine producing bacterial identification in stored 657
- Saw dust**
  - green gram, saw dust protection for *Callosobruchus maculatus* infested 565
- Scendesmus obliquus**
  - see Algae
- Seafoods**
  - Shigella dysenteriae* in seafoods 656
- Sensory evaluation**
  - sensory difference testing 684
- Sensory properties**
  - grain powders, sensory optimization of roasted 683
  - khao, whey protein conc. & sensory properties of cow-milk based 629
  - rice var., sensory properties of Assam 546

**Sheep milk**

storage frozen & fat in raw sheep milk 619

**Shelf-life**

kinnow mandarin fruits, harvesting periods & shelf-life of 596  
paneer, additives & shelf-life enhancement of 630

**Shigella dysenteriae**

seafoods, *S. dysenteriae* in 666

**Single-cell proteins**

rice hull hemicellulose black liquor bioconversion into single-cell proteins 540

**Sitophilus oryzae**

wheat, grain protectants & germination/damage of *S. oryzae* infested 553

**Sitotroga cerealella**

corn, insecticide sprays in *S. cerealella* infested stored 559

**Sodium caseinates**

production of sodium caseinates 620

**Sodium hypochlorite**

litchi cv Calcutta, sodium hypochlorite & cold storage of 597

**Soft drinks**

Mg(II) detn. in soft drinks 520

**Solar drying**

raisin production, solar-drying for, Himachal Pradesh 600

**Sorghum flour**

infestation control in tricalcium phosphate treated stored sorghum flour 560

**Sorption**

food materials, GAB equation parameter *k* & sorption isotherms of 517

**Soy flour**

packaging materials & chemical/microbial changes in stored full-fat soy flour 577  
preparation of medium fat-soy flour 576

**Soybean oils**

clay minerals & pigments adsorption from alkali-refined soybean oils 674  
clay-Zambian for bleaching soybean oils 678  
reactors with static mixers & continuous hydrogenation of soybean oils 679

**Soybeans**

flavour/properties of hexane extracted soybeans 575  
food surfactants, soy

lysophospholipids & surface activity of 574

**Speciality foods**

roasted blended foods as speciality foods 503

**Spectrophotometry**

dairy products, lysine detn. spectrophotometry in 607

**Spinach**

leaves, ascorbic acid contents in stored spinach 588

**Spray drying**

coffee whiteners, acid whey in spray-dried 663

**Sprouting**

yam tubers, sprouting control gibberellic acid in 586

**Stability**

beer foam, nitrogenous compounds stability in 660

carrageenan gels, *Lactobacillus bulgaricus* stability immobilized in 534

chicken gizzard pickles, storage stability of 649

intermediate moisture smoked meats, stability of stored 638

milk, folic acid stability in hydrogen peroxide-potassium thiocyanate-treated 615

potato chips, oxidative stability detn. Rancimat method in 584

tea drinks, pH & composition stability in canned 667

**Staphylococcus aureus**

turkey muscle extracts, *Staph. aureus* enterotoxin B production & physicochemical changes in 650

**Starch**

in vitro digestibility of starch 695

**Starters**

Gouda cheese, starters concn. effect on ultrafiltered 623

**Storage**

beef, storage characteristics of electrically stimulated/hot boned/non-stimulated/cold-boned 641

blackgram, storage structures & mycoflora/viability of stored 561

chicken gizzard pickles, storage stability of 649

chocolate caramel rolls, storage stability of 603

coconut water, storage & preservation of 568

corn, insecticides sprays in *Sitotroga cerealella* infested stored 559

corn, storage losses in 558  
eggs, storage conditions & quality of duck/chicken 651  
grain storage complex-cum processing rural centre, design of 688

groundnuts, insects/mites on stored, Andhra Pradesh 570

groundnuts, storage system & quality/milling properties of 571

intermediate moisture smoked meats, stability of stored 638

safflower seed, containers & storage of 573

sorghum flour, infestation control in tricalcium phosphate treated stored 560

soy flour, packaging materials & chemical/microbial changes in full-fat 577

**Storage cereals**

grains, insect infestation control in stored 690

rice, storage condition & milling quality of 549

**Storage cold**

orange peels, essential oils in cold stored Thompson Navel 599

**Storage fish**

sardines, histamine producing bacterial identification in stored 657

**Storage frozen**

litchi cv. Calcutta, fungicides & cold storage of 597

sheep's milk, frozen storage & fat in raw 619

**Storage fruits**

bananas, storage temp./modified atm. & cooking of New South Wales grown 595

respiration & ethylene evolution in controlled atm. stored fruits 591

**Storage vegetables**

cassava gari, cassava var./storage & quality of 580

onions, storage of, review 578

potatoes, ascorbic acid/enzymic activities in stored 582

potatoes, storage time/temp. & carbamates in 583

respiration & ethylene evolution in controlled atm. stored vegetables 591

spinach leaves, ascorbic acid contents in stored 588

**Strawberries**

flavour quality of aroma recovered strawberry pulp 601



- milk beverages, carbonation level & sensory properties of strawberry flavoured 610
- Streptococcus thermophilus**  
substrate concn. & growth/lactic acid production by *L. bulgaricus*/*Strep. thermophilus* 532
- Sulphur**  
*Cucumis melo*, aroma volatiles-S containing in 602  
water-non-electrolyte mixtures, sulphur(IV) oxospecies infrared/ultraviolet spectra in 523
- Sun-drying**  
raisin production, sun-drying for, Himachal Pradesh 600
- Sunflower oils**  
clay minerals & pigments adsorption from alkali-refined sunflower oils 674
- Sweet potatoes**  
 $\gamma$ -irradiation &  $\beta$ -carotene isomerization in sweet potatoes 585
- Swelling**  
dry beans, water absorption/swelling in 563
- TBHQ**  
paneer, TBHQ & shelf-life enhancement of 630
- Tea**  
canned tea drinks, pH & composition stability in 667  
green tea flavour compounds, antimicrobial activity of 668
- Technology**  
consumer trends & technology 501
- Texture**  
khao, whey protein conc. & texture of cow-milk based 629
- Thiourea**  
litchi cv, Calcutta, thiourea & cold storage of 597
- Tocopherol**  
oils, tocopherols/fluorescence levels in deep-frying 671
- Tomatoes**  
glycosides in tomatoes 590  
respiration & ethylene evolution in controlled atm. stored tomatoes 591
- Toxoplasma gondii**  
meats, *T. gondii* in 636
- Trandescantia pallida**  
food colourants 543
- Transportation**  
eggs, transportation & quality of duck 652
- Tricalcium phosphates**  
sorghum flour, infestation control in tricalcium phosphate treated stored 560
- Trypsin inhibitors**  
red gram, heat/UV & trypsin inhibitors in 566
- Turkeys**  
muscle extracts, *Staphylococcus aureus* enterotoxin B production & physicochemical changes in turkey 650
- Ultrafiltration**  
dairy industries, UF in 606  
milk, ultrafiltration & partitioning permeate/retentate in 612  
milk, ultrafiltration & protein isolate from 613
- Ultraviolet**  
microorganisms, decontamination-ultraviolet of 528  
red gram, UV & trypsin/chymotrypsin inhibitors in 566
- Variance**  
coffee whiteners, analysis of variance for 685
- Vegetables**  
internal atm. of vegetables 592  
production of vegetables, India 504  
respiration & ethylene evolution in controlled atm. stored vegetables 591
- Viscoelastic properties**  
rice var., viscoelastic properties of Assam 546
- Viscosity**  
apple juices, temp./concn. & viscosity analysis of 664  
chitosan solution, viscosity-mol. wt. relationship of 654
- Vitamins**  
camel milk, vitamin content in 608
- Volatile compounds**  
brewer's yeast & fermentation/production of flavour volatile compounds 661  
protein glycation & formation of volatiles 518
- Water**  
Mg(II) detn. in water 520  
pork, water condition in 644
- Water absorption**  
dry beans, water absorption/swelling in 563
- Water melons**
- Cucumis melo*, aroma volatiles-S containing in 602
- Water-holding capacity**  
meat, water-holding capacity/rheological properties of coarsely minced 637  
milk proteins, water-holding capacity of, review 633
- Weaning**  
survey of weaning practices in Irulas/Lambas 658
- Wheat**  
deltamethrin residues detn. in stored wheat 550  
export potential of wheat 554  
grain protectants & germination/damage of *Sitophilus oryzae* infested wheat 553  
insect infestation control in stored wheat, West Bengal 690  
quality of rain damaged wheat, Mathura 552
- Wheat flour**  
baking quality prediction  
farinograph of chlorinated/unchlorinated flours 556  
lipids solid-phase extraction from wheat flour 555
- Wheat germ oils**  
clay minerals & pigments adsorption from alkali-refined wheat germ oils 674
- Wheat products**  
export potential of wheat products 554
- Whey**  
coffee whiteners, acid whey in spray-dried 663
- Whey protein concentrates**  
khao, whey protein conc. & sensory/texture of cow-milk based 629
- Whiteners**  
coffee whiteners, acid whey in spray-dried 663
- Wine making**  
heat generation rate estimation in wine making 662
- Wood ash**  
greengram, wood ash protection for *Callosobruchus maculatus* infested 565
- Yams**  
sprouting control gibberellic acid in yam tubers 586
- Yeast brewer's**  
volatile compounds, brewer's yeast & fermentation/production of flavour 661

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701

Gormley (R). **FLAIR-FLOW EUROPE: A dissemination route to the food industry and consumers.** *Trends in Food Science and Technology* 3(5): 1992; 103-106

This article outlines the background, structure and work of cooperative European community project, the FLAIR-FLOW EUROPE project which aims to disseminate the information about food safety, quality and nutrition to small and medium-sized enterprises within the European food industry and to consumers. GS

702

Blaschek (HP). **Approaches to making the food processing industry more environmentally friendly.** *Trends in Food Science and Technology* 3(5): 1992; 107-110

Microbial and cell-free enzyme systems that bioconvert food processing wastes into value-added products offer the promise of both cost savings and a more environmentally friendly food industry. This review focuses on food based bioconversions using non-toxiogenic clostridia, yeasts and cell-free enzyme systems. 34 references. BV

## FOOD PROCESSING

703

Naito (S). **Studies on utilization of ozone in food preservation.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 38(4): 1991; 360-367

## FOOD PACKAGING

704

Knowles (M). **The impact of legislation on food packaging.** *Food Science and Technology Today* 4(2): 1990; 97-101

705

Penman (A). **The product - package interaction.** *Food Science and Technology Today* 4(2): 1990; 101-105

The developments in the consumer environment which has led to changes in the eating habits; its implication on the food industry; the role of

packaging in the total product design; types of packaging techniques are discussed. GS

706

Renshaw (J). **Packaging and the retail trade: Towards 2000.** *Food Science and Technology Today* 4(2): 1990; 105-109

707

Charbonneau (JE). **Application of scanning electron microscopy and x-ray microanalysis to investigate corrosion problems in plain and enamelled three piece welded food cans.** *Food Structure* 10(2): 1991; 171-184

SEM together with X-ray microanalysis, either by itself or in combination with food analytical procedures was found excellent to investigate and diagnose the causes of corrosion in plain and enamelled metal food containers. SD

## Packaging materials

708

Shukla (SK) and Misra (AN). **Corrosion inhibition of mild steel in cooling waters by benzotriazole - an anodic polarisation study.** *Research and Industry, India* 37(3): 1992; 175-177

Corrosion inhibition of mild steel by benzotriazole was studied by static method. Water with high hardness, chloride and sulphate used for cooling caused poor inhibition compared to water with low hardness, chloride and sulphate. Higher concn. of benzotriazole (1% and 2%) increased inhibition. GS

## Plastics

709

Wille (G). **Plastic films for packaging of foodstuffs - What's new ?.** *Lebensmittelindustrie* 38(3): 1991; 72-73 (De)

## FOOD ENGINEERING AND EQUIPMENT

710

Sanjay Jain, Lala (AK), Bhatia (SK) and Kudchadker (AP). **Modelling of hydrolysis controlled anaerobic digestion.** *Journal of Chemical Technology and Biotechnology* 53(7): 1992; 337-344

A mathematical model of anaerobic digestion has been developed which considers the process as occurring through hydrolysis followed by a sequence of steps which have been considered together as a

pseudo-first order process. The Michaelis-Menten equation has been modified to incorporate variable enzyme concn. An immobilized reactor has been designed, fabricated and operated on cowdung feed to obtain data for estimating the model parameters by non-linear regression. These model parameters were used to predict the performance of the reactor and good agreement between experimental and predicted values was observed. The model was further tested satisfactorily on data from the literature. From the parameters estimated it was concluded that hydrolysis was the slowest stage and that the mass transfer of hydrolytic enzyme from microbe to bulk was the rate controlling step in this stage. The hydrolysis reaction, represented by a modified Michaelis-Menten equation, was reduced to first order in bulk enzyme concn. and zero order in substrate concn. thereby emphasizing the significance of bulk enzyme concn. AA

711

Renuad (T), Briery (P), Andrieu (J) and Laurent (M). **Thermal properties of model foods in the frozen state.** *Journal of Food Engineering* 15(2): 1992: 83-97

Thermal diffusivities and thermal conductivities of model food systems were measured by two transient methods: the flash method and the hot wire probe method. Experimental runs were carried out between +20°C and -40°C with binary food gels: water + gelatin; water + ovalbumin; water + starch; water + sucrose. These results were compared with the main thermal conductivity models (series, parallel, Maxwell, series-parallel). The conductivity data which are very sensitive to the ice fraction are best fitted by the Maxwell's model. AA

712

Scott (EP) and Beck (JV). **Estimation of time variable heat transfer coefficients in frozen foods during storage.** *Journal of Food Engineering* 15(2): 1992: 99-121

Many investigators have studied heat transfer coeff. in foods during freezing, but little work has been done on the estimation of surface heat transfer coeff. in frozen foods during storage. This paper investigates a method for the estimation of time variable surface heat transfer coeff. in frozen foods during storage. This method is unique in that it allows for the estimation of surface heat transfer coeff. as a function of time and in that the procedure incorporates temp. dependent thermal properties. The estimation method is based on the sequential-regularization solution which involves the minimization of a least squares function containing calculated and experimental temp. Certain parameters inherent in this method were

first determined using simulated data. Experimental temp. measurements were then obtained using the Karlsruhe Test Substance (Gutschmidt, 1960), a methylcellulose material commonly used in food freezing studies. Estimations of the surface heat transfer coeff. from this data varied with changes in the surface and ambient condition; the estimated values ranged from 6 to 12 W/m<sup>2</sup>°C. AA

713

Al-Duri (B) and McIntyre (S). **Comparison of drying kinetics of foods using a fan-assisted convection oven, a microwave oven and a combined microwave/convection oven.** *Journal of Food Engineering* 15(2): 1992: 139-155

The drying rate curves in terms of moisture content versus time for 5 types of foodstuff have been experimentally obtained using a convection, microwave and combined microwave/convection oven. The foodstuff studied is skimmed milk, whole milk, casein powders, butter and fresh pasta. The effects of changes in temp. and power output have been investigated, respectively. It has been found that the drying rate increases with temp. increase in convection ovens and power outputs in microwave ovens. Furthermore, ni-speed ovens produce the fastest drying rate, yet a microwave oven causes the least damage of food. AA

714

Anon. **Mathematical evaluation of food dispersions.** *Journal of Food Engineering* 15(2): 1992: 157-165

This work covers the known methods of evaluation of the size distribution and sedimentation stability of liquid food products containing solid (suspensions) or liquid particles (emulsions). The study introduces an instrumental method of control and calculation of the degree of homogenization and sedimental stability of products. The method is used to estimate the quality of a milk homogenization process. AA

715

Abichandani (H) and Sarma (SC). **Evaporation in a horizontal thin film scraped surface heat exchanger.** *Journal of Food Process Engineering* 14(3): 1991: 173-187

Literature surveys have revealed inadequate information on heat transfer characteristics during evaporation in straight-sided horizontal thin film scraped surface heat exchangers (SSHE). The evaporation of water, concn. of milk and dehydration of cream (30 - 40% total solids) at different rotor speeds, number of blades, flow rates and temp.



differentials were studied in 108 tests with objectives to develop a predictive equation for overall heat transfer coeff. and to study its variation with regard to above parameters in the light of proposed mechanism governing fluid flow, film formation and heat transfer. Data were processed in HCL system-4 computer to fit in quadratic form by method of least squares. Experiments were conducted at higher temp. compared to those encountered in milk evaporators. The information would be useful in designing SSHE for processing several Indian dairy products. AA

716

Palaniappan (S) and Sastry (SK). **Electrical conductivities of selected solid foods during ohmic heating.** *Journal of Food Process Engineering* 14(3): 1991; 221-236

Electrical conductivities of 3 vegetable and two meat samples were determined by subjecting them to a constant voltage power supply in a static ohmic heating device. Conductivities of vegetable samples were increased by soaking them in salt solutions, while soaking in water resulted in reduced conductivity due to leaching of electrolytes. Conductivities under ohmic heating conditions increased linearly with temp. When field strengths were decreased, the conductivity-temp. curve gradually became nonlinear, and under conventional heating conditions, a sharp transition was observed. AA

## Equipments

## Biosensors

717

Kress-Rogers (E). **Biosensor - based instruments for the food industry.** *Food Science and Technology Today* 4(3): 1990; 166-171

## ENERGY IN FOOD PROCESSING

Nil

## FOOD CHEMISTRY AND ANALYSIS

## Chemistry

718

Schirle-Keller (J-P), Chang (HH) and Reineccius (GA). **Interaction of flavour compounds with microparticulated proteins.** *Journal of Food Science* 57(6): 1992; 1448-1451

The vapor pressures of acetaldehyde, diacetyl, ethyl benzene, ethyl caproate, ethyl heptanoate, ethyl sulphide, hexanal, trans-2-hexenal, D-limonene, octanone, 1-pentanol, 2-pentanone, and styrene (50 p.p.m. each) over a vegetable oil emulsion, water or selected fat replacer (aqueous sol., 37°C) was monitored. The 5 fat replacers were a whey-based and an egg based microparticulated protein, a pregelatinized tapioca maltodextrin, microcrystalline cellulose (MCC) and a MCC/carboxymethyl cellulose blend. The flavour compounds interacted with oil in a predictable manner following Raoult's Law. The fat replacers generally had little influence on vapour pressure of the flavour compounds behaving as in a water system except for the Simplese products which had substantial interaction with aldehydes. AA

719

Macku (C) and Shibamoto (T). **Formation of N-alkylpyrroles in corn oil/amino acid model systems.** *Food Chemistry* 45(1): 1992; 33-36

Volatiles formed by heating corn oil with alanine, cysteine, glycine, phenylalanine, ammonia, methylamine or ethylamine at 180°C for 4 h were analysed by GC and GC/MS. 14 mono- and di-alkyl-pyrroles were identified in the headspace extracts of the corn oil/amino acid mixtures and corn oil/amine mixtures. The formation of 1-alkylpyrroles is proposed as due to the reaction of  $\alpha$ -,  $\beta$ -unsaturated fatty aldehydes with the alkylamine produced from the corresponding pyrolyzed amino acid. SD

## Chemistry(Analytical)

720

Losada (PP), Mahia (PL), Oderiz (LV), Lozano (JS) and Gandara (JS). **Sensitive and rapid reversed-phase liquid chromatography-fluorescence method for determining bisphenol A diglycidyl ether in aqueous-based food simulants.** *Journal of the Association of Official Analytical Chemists* 74(6): 1991; 925-928

A method has been developed for detn. of bisphenol A diglycidyl ether (BADGE) in 3 aqueous-based food simulants: water, 15% (v/v) ethanol, and 3% (w/v) acetic acid. BADGE is extracted with C18 cartridges and the extract is conc. under a stream of nitrogen. BADGE is quantitated by reversed-phase liquid chromatography with fluorescence detection. Relative precision at 200  $\mu\text{g/L}$  was 3.4%, the detection limit of the method was 0.1  $\mu\text{g/L}$ , and recoveries of spiking concn. from 1 to 8  $\mu\text{g/L}$  were nearly 100%. Relative standard deviations for the method ranged from 3.5 to 5.9%, depending on the

identity of the spiked aqueous-based food simulant.  
AA

721

Aleksandrova (LG), Korolev (AM) and Preobrazhenskaya (MN). **Study of natural ascorbigen and related compounds by HPLC.** *Food Chemistry* 45(1); 1992: 61-69

HPLC revealed that Ascorbigen B (2-epimer of natural ascorbigen) is a mixture of compounds - natural ascorbigen 'dimer' being the major component and its 'trimer' the minor component. To determine the ascorbigen content and its transformation products in extracts of fresh or sour cabbage a reverse-phase chromatographic system with gradient elution was developed with l'-methylascorbigen as an internal standard. Ascorbigen was 2.4 - 5.5 mg/100 g fresh wt., ascorbigen 'dimer' 0.1 - 0.3 mg/100 g fresh wt. and ascorbigen 'trimer' 0.1 - 0.3 mg/100 g fresh wt., 3-hydroxymethylindole 0.2 - 0.3 mg/100 g fresh wt. and (indole-3-yl) acetonitrile 0.1 - 0.5 mg/100 g fresh wt. in extracts of fresh or sour cabbage. SD

## FOOD MICROBIOLOGY AND HYGIENE

722

Dodd (C). **Detection of sites of microbial growth in food by cryosectioning and light microscopy.** *Food Science and Technology Today* 4(3); 1990: 180-182

### Enzymes

723

Roller (S) and Swinton (S). **Enzymes and the food industry: The role of the Leatherhead Food Research Association.** *Food Science and Technology Today* 4(2); 1990: 111-114

The application of enzymes to the modification of meat texture; for the production of functional food ingredients such as bulking agents, emulsifiers, stabilizers and gelling agents; and for the enzyme immunoassays for the identification of food pathogens are described. GS

724

Lambelet (P), Loliger (J), Saucy (F) and Bracco (U). **Antioxidant properties of coenzyme Q<sub>10</sub> in food systems.** *Journal of Agricultural and Food Chemistry* 40(4); 1992: 581-584

Antioxidant properties of coenzyme Q<sub>10</sub> (ubiquinone 10, CoQ<sub>10</sub>) and its reduced form, ubiquinol 10

(CoQ<sub>10</sub>H<sub>2</sub>), were determined in foods and the results discussed on the basis of radical exchange reactions occurring between these compounds and lipid radicals. CoQ<sub>10</sub> does not react with peroxidizing lipids and therefore is not a food antioxidant. Although forming the corresponding semiquinone radical by reaction with peroxidizing lipid, CoQ<sub>10</sub>H<sub>2</sub> is only a poor food antioxidant, as it is rapidly transformed into the corresponding inactive quinone in air. To be active as a food antioxidant, CoQ<sub>10</sub> must be used in conjunction with a reducing agent such as vitamin C. AA

### Microorganisms

725

Chen (HC) and Wu (S-D). **Agar medium for enumeration of fecal coliforms.** *Journal of Food Science* 57(6); 1992: 1454-1457

Spread-inoculated plates of fecal-coliform agar (FCA) were pre-incubated 2 h at 35°C, and then transferred to 44.5°C for 22 h. Fecal coliforms on FCA produce acids and CO<sub>2</sub> which react with bromocresol purple and calcium lactate to form yellow-yellowgreen colonies surrounded by a pale yellow zone. Recovery of control of freeze-stressed *Escherichia coli* on FCA was about 1 log cycle lower than that with nonselective media. The accuracy for FCA to enumerate fecal coliforms from 138 typical colonies of 3 food samples was 98.6%; while the false positive was 1.4%. When the method was compared with the standard 3-tube MPN method for fecal coliforms, counts from 2 methods were not significantly different (p > 0.05). AA

726

Kohlmann (KL), Nielsen (SS), Steenson (LR) and Ladisch (MR). **Production of proteases by psychrotrophic microorganisms.** *Journal of Dairy Science* 74(10); 1991: 3275-3283

Six milk-derived psychrotrophic microbial cultures were screened for the ability to grow at refrigerated temp. and produce proteases in reconstituted skim milk. Of these, two cultures, *Pseudomonas fluorescens* M3/6 and *Pseudomonas fragi* K122, produced extracellular protease(s) beginning 7 day postinoculation when the cultures had entered late log or early stationary phases of growth. Further work with these two cultures showed that intracellular proteases were present after only 20 h incubation, before detection of the extracellular proteases. Using H-D-valyl-L-leucyl-L-lysyl-4-nitroanilide (S-2251), a sensitive substrate for plasmin activity, *P. fluorescens* was shown to have greater intracellular proteolytic activity than extracellular activity at 20 h of incubation. The intracellular enzyme activity remained constant



while the extracellular and periplasmic activities increased over the remaining 6 days incubation period. The proteases in crude extracellular extracts from both cultures were characterized and were heat stable with broad temp. (7 to 52°C) and pH (pH 5.5 to 8.5) ranges for activity and were inhibited by the metal chelator, EDTA, indicating that they were metalloproteases. AA

## Bacteria

### *Listeria monocytogenes*

727

Harris (LJ), Fleming (HP) and Klaenhammer (TR). **Sensitivity and resistance of *Listeria monocytogenes* ATCC 19115, Scott A, and UAL500 in nisin.** *Journal of Food Protection* 54(11); 1991; 836-840

*L. monocytogenes* ATCC 19115, Scott A, and UAL500 were evaluated for sensitivity to nisin (0 to 50 µg/ml) using a direct plating method. Nisin (10 µg/ml) decreased an initial population of *L. monocytogenes* (10<sup>9</sup> CFU per ml) by 6- to 7-log cycles. Sensitivity to nisin was enhanced by addition of 2% NaCl or by reduction of the medium pH from 6.5 to 5.5 with either hydrochloric or lactic acid. Mutants resistant to 50 µg/ml nisin were detected at frequencies of 10<sup>-6</sup> to 10<sup>-8</sup>. Nisin-resistant *L. monocytogenes* mutants should be expected to arise when nisin is used as an antimicrobial in food systems. AA

## Salmonella

728

Wyatt (G), Lee (H) and Morgan (M). **Immunoassays in the food industry - development of a rapid *Salmonella* assay.** *Food Science and Technology Today* 4(3); 1990; 178-180

## Fungi

### Mushrooms

729

Ajlouni (SO), Beelman (RB), Thompson (DB) and Mau (J-L). **Stipe trimming at harvest increases shelf-life of fresh mushrooms (*Agaricus bisporus*).** *Journal of Food Science* 57(6); 1992; 1361-1363, 1374

Trimming the stipe of cultivated mushrooms, *Agaricus bisporus*, from 35 mm to 5 mm from the cap immediately after harvest resulted in improved shelf-life as indicated by reduced browning and

slower cap opening. This effect was evident after 3 days storage at 12°C, and became more pronounced after 6 days. Trimming the stipes had no significant effect on postharvest respiration rate or bacterial growth; thus, the shelf-life improvement was due to other factors. Stipe trimming reduced the wt. (yield) of saleable mushrooms by about 10%; thus, shelf-life improvement would need to offset any economic loss to growers to make this practice commercially feasible. AA

### *Rhizopus oryzae*

730

Banerjee (R), De (KB) and Bhattacharyya (BC). **Optimization of extracellular protease biosynthesis by a newly isolated *Rhizopus oryzae*.** *Indian Journal of Technology* 30(6); 1992; 275-280

Reports the results on the process optimization for protease synthesis by *R. oryzae* (RO, IIT KGP) under acidic and alkaline culture conditions evaluating the effect of metal ions, surfactants, phenolics and fungicides on the synthesis of protease. A remarkable increase in protease synthesis was observed with Ag<sup>+</sup> ion. With other metals enhancement was considerable in alkaline media. Addition of phenolics like catechol, cinnamic acid, salicylic acid in basal medium resulted in some inhibitory effect. Ferulic and tannic acid totally inhibited protease production at higher concn. In the alkaline culture condition with increase in Tween 80 concn. of 0.2%, protease activity increased and protease production was max. at 0.5% concn. of the surfactant in both alkaline and acidic culture condition. A 3.21-fold increase in protease synthesis was observed with 0.05 mg/100 ml silver nitrate in alkaline culture, and a 4.2-fold increase with Tween 80 of 0.05 ml/100 ml. The optimum initial pH and temp. for protease synthesis was 30°C, pH 5 and 37°C, pH 10. It concludes that the organism has the quality to become an industrial strain. SRA

## Yeasts

731

Deepa Bhajekar and Kulkarni (PR). **Effect of osmotic shock on osmotolerant yeasts.** *Die Nahrung* 35(8); 1991; 835-839

Shock exposure of osmotolerant yeasts *Debaryomyces hansenii* 3339, *Zygosaccharomyces mellis* 3296 and *Kloeckera antillarum* 3046 to solutions of sucrose at a<sub>w</sub> values between 0.99 and 0.88 was found to cause a great decrease in cell vol. but an increase in heat resistance. For *D. hansenii* the cell vol. decreased from 28 µm<sup>3</sup> to 4 µm<sup>3</sup> and it

could withstand a temp. of 65°C for over 20 min. *Z. mellis* and *K. antillarum* showed a decrease in cell vol. from 31  $\mu\text{m}^3$  to 3  $\mu\text{m}^3$  and 4  $\mu\text{m}^3$  respectively and both survived a heat treatment of 75°C for over 30 min. AA

### **Geotrichum candidum**

732

Hang (YD) and Woodams (EE). **Purification and characterization of lactate dehydrogenase from *Geotrichum candidum*.** *Food Chemistry* 45(1): 1992: 15-17

The crude extract of *G. candidum* contained an appreciable amount of NAD-independent lactate dehydrogenase activity. The 60-fold purified enzyme catalyzed the oxidation of L-lactate to pyruvate with potassium ferricyanide and 2,6-dichlorophenol indophenol as electron acceptors and could be used as a diagnostic tool for the specific detn. of lactic acid in foods, beverages and other biological materials. SD

### **Hygiene**

733

Bohner (HF) and Bradley (RL). **Corrosivity of chlorine dioxide used as sanitizer in ultrafiltration systems.** *Journal of Dairy Science* 74(10): 1991: 3348-3352

Chlorine dioxide is a very potent sanitizer in UF systems and other applications in which soil residues are frequent. Two sanitizers containing chlorine dioxide as the active ingredient were examined for their potential of corroding stainless steels used in the construction of UF systems. One sanitizer was an acidified solution of dilute sodium chlorite at pH 2.7; the other sanitizer was dilute chlorine dioxide (about 15 p.p.m.) in tap water. Stainless steel types 304 and 316 corroded rapidly when exposed to the acidified chlorite solution. Chlorine dioxide near neutral pH 7.2 was noncorrosive to both type 304 and 316 stainless steels at a concn. of 100 p.p.m. during 10 days of continuous exposure. This concn. is well above the typical use concn. of 15 p.p.m.; typical use time span is 15 min. AA

## **BIOTECHNOLOGY**

734

Kapoor (R) and Mehta (U). **Iron bioavailability from *Spirulina platensis*, whole egg and whole wheat.** *Indian Journal of Experimental Biology* 30(10): 1992: 904-907

Bioavailability of Fe from diets containing FeSO<sub>4</sub>. *Spirulina* whole wheat (WW) and whole egg (WE) were assessed in male albino rats by haemoglobin (Hb) depletion method. The mean values at the start of depletion for Hb and packed cell vol. (PCV) were 9.42 g/100 ml and 33%, respectively which came down to 6.69 g/100 ml and 28.6% after 21 days of depletion period. At the termination of repletion period the average Hb concn. increased by nearly the same % in *Spirulina* (52), WW (57) and WE (55) diet groups, but Hb increase with FeSO<sub>4</sub> diet (75) was higher than *Spirulina*, WW, WE diets. Except in FeSO<sub>4</sub> diet, the PCV increased by nearly the same % in *Spirulina* WW, WE fed groups. The absorption of Fe from *Spirulina* (54.62%) was significantly < FeSO<sub>4</sub> (68.2%) and WE (65.36%), but significantly > WW (48.54%). SRA

## **TISSUE CULTURE**

Nil

## **FOOD ADDITIVES**

735

Sareen (S). **Food additives - role of Indian standards.** *ISI Bulletin* 6(3): 1992: 71-73

Reviews the standardization work on food additives by the Bureau of Indian Standards and the provision of the Prevention of Food Adulteration Act in containing their misuse. Aspects covered include classification, permitted food additives, standards formulation, certification, international scene and future tasks in the area of food additives. SRA

### **Preservatives**

736

Buazzi (MM) and Marth (EH). **Mechanisms in the inhibition of *Listeria monocytogenes* by potassium sorbate.** *Food Microbiology* 8(3): 1991: 249-256

*L. monocytogenes* was injured by treating the bacterium with a solution of 1% (w/v) potassium sorbate for 30 min. Injury was shown by inability of the bacterium to tolerate 6% NaCl in tryptose agar (TA) and ability to grow on TA with no added salt. Colony-forming ability of injured cells was restored when they recovered in tryptose broth containing sub-lethal amounts of metabolic or synthetic inhibitors. 2,4-Dinitrophenol was the only inhibitor which effectively prevented recovery of injured cells. No changes occurred in the cell membrane that



addition soluble proteins or nucleotides to leak from cells during the course of sorbate injury. AA

## Stabilizers

## Gums

737

Soni (PL), Sharma (S) and Shiva (MP). ***Leucaena leucocephala* (Subabul) tree - a new potential source of gum.** *Research and Industry, India* 37(4); 1992: 223-227

Rheological properties of subabul gum were compared with other commercially important *A. senegal* and *Acacia nilotica* gums. The synergistic action and mode of interaction of xanthan gum with the gums of *L. leucocephala*, *A. senegal* and *A. nilotica* was also reported. GS

## Guar gums

738

Khan (WU), Surana (A) and Grover (PD). **Viscosity of carboxymethyl hydroxypropyl guar gum solution as a function of temperature concentration, pH and additives.** *Research and Industry, India* 37(4); 1992: 243-248

CMHPG - a mixture of carboxymethyl (CMG) and hydroxypropyl (HPG) groups into guar gum, had an insoluble residue content of 0.3 - 0.5 wt. % and viscosity of 965 cPs. The decrease in viscosity and insoluble residues content of CMHPG as compared to the hydroxypropylated guar gum was due to the acidic nature of the carboxymethyl group causing cleavage in the guar molecular chain. CMHPG showed compatibility with 2% KCl sol. The viscosity of a fully hydrated CMHPG sol. varied directly with temp. in the range 30 - 95°C. The presence of carboxymethyl group in CMHPG, imparted better solubility than HPG because of its ionic nature. CMHPG sol. were found stable over a wide pH range. At pH below 6.0 the sol. tended to decompose. GS

## Sweeteners

739

Nalini Ayya and Lawless (HT). **Quantitative and qualitative evaluation of high-intensity sweeteners and sweetener mixtures.** *Chemical Senses* 17(3); 1992: 245-259

High intensity sweeteners were evaluated for sweetness and bitterness intensity using time-intensity scaling. Mean intensities of 50:50 mixtures as well as the single sweeteners were used

to compute predicted scores which were compared to the observed scores as a means of evaluating additivity in the mixtures. Conc.-dependent effects of subadditivity, additivity and hyperadditivity were observed within some sweetener pairs, but these did not follow any consistent pattern across sweeteners. Synergy, a special case of hyperadditivity evaluated by comparing predicted to observed scores, was seen in mixtures of aspartame and acesulfame-K at all concn. Aspartame/saccharin blends were synergistic only at the lowest concn. tested, despite the structural similarity between acesulfame-K and saccharin. Blands of sucrose/aspartame and acesulfame-K/saccharin did not exhibit synergy. Comparisons based on ratings of initial sweetness rather than the whole time-intensity curve, reflected previous findings of synergy in some sweetener pairs. AA

## CEREALS

## Paddy

740

Rajendra Kumar (K) and Zakiuddin Ali (S). **Properties of rice starch from paddy stored in cold and at room temperature.** *Starch/Stärke* 43(5); 1991: 165-168

Brabender viscograms of rice flour from aged paddy (stored at room temp., RT 20 - 33°C for 15 months) of two high amylose fine grain cvs showed higher paste viscosities than that from the paddy stored at 4 - 6°C (cold) for the same period. The differences were almost eliminated in case of isolated starches. The total amylose content was same for the starches from both aged (RT stored and cold stored) paddy. However, the hot water soluble amylose content was less in starches from "aged" paddy. The number average mol. wt. ( $M_n$ ) as well as the swelling power and solubility of the starches from RT stored (aged) paddy were also less indicating that the aging of rice could partly be associated with the changes in the physicochemical properties of its starch. AA

## Rice

741

Salhee (BC) and Das (AK). **Biochemical changes during maturation and development of rice grain (*Oryza sativa*).** *Madras Agricultural Journal* 78(5-8); 1991: 168-170

Four rice cv., ES 1-2-3, CRM 13-3241, CR 237-1 and HPU 741 were analysed for reducing sugar, starch, protein and its different fractions and trace

elements, Fe, Mn and Zn during maturation and development period. Reducing sugar content decreased; starch and protein contents increased during maturation. Changes in Fe was more in ES 1-2-3. HPU 741 showed significant changes in Zn. CR 237-1 and HPU 741 were susceptible to changes in Mn. GS

742

Saraswat (VK) and Bansal (KN). **Methods of zinc application and its effect on yield and zinc content of rice (*Oryza sativa*) and wheat (*Triticum vulgare*).** *Madras Agricultural Journal* 78(5-8); 1991: 174-177

Direct and residual effect of different methods of Zn application on the yield and Zn content of rice and wheat were studied. Applied Zn increased the Zn content and uptake by grain and straw of both rice and wheat. The Zn concn. in control (wheat grain) rose to 42.8 p.p.m. from 27.2 p.p.m. in 1977-78 and to 37.3 p.p.m. from 24.8 p.p.m. in 1978-79. GS

743

Nikkuni (S), Ishiyama (T) and Suzuki (C). **Changes in rice proteins during miso fermentation.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 38(4); 1991: 316-322 (Ja)

Changes in rice proteins during miso fermentation were investigated. The percentages of water-soluble nitrogen content to total nitrogen content (nitrogen solubility) of the steamed rice samples (4 samples) were 0.3 - 0.4%. The nitrogen solubilities of the koji samples prepared with these steamed rice samples were 9 - 14%. When each koji sample was mixed with salt (at finally 12%) and water (at finally 44%) and allowed to ferment at 30°C for 60 days, the nitrogen solubilities were ranged from 35 to 44%. There were not so differences in the SDS-polyacrylamide gel electrophoretic (SDS-PAGE) pattern between the lyophilized soaked rice samples and the water-insoluble fractions of the koji samples. Clear bands with mol. wts. of 22 - 23 KDa and faint bands with mol. wts. of 26, 37, 39 and 57 KDa were observed in the SDS-PAGE patterns of the water-insoluble fraction of the mixture fermented for 60 days. When the koji was mixed with salt, water and cooked soybeans to make miso and the mixture was allowed to ferment at 30°C for 60 days, the nitrogen solubility increased to approx. 60%. The bands with mol. wts. of 5 to 15, 22 - 23 KDa, 26, 37, 39 and 57 KDa were observed in the SDS-PAGE pattern of the water-insoluble fraction of the miso. From the above results, it is found that rice proteins, especially of basic subunits of glutelin with mol. wt. of 22 - 23 KDa, are hardly digested by koji enzymes during miso fermentation. AA

744

Siscar-Lee (JJH), Juliano (BO), Tsuji (S), Chikubu (S) and Faure (J). **Viscosity and flow properties of cooked milled rice slurries.** *Starch/Starke* 43(6); 1991: 220-225

The applicability of a microcone plate viscometer for measuring some rheological properties of cooked milled rice slurries was studied on milled rices differing in cooked rice texture properties. Viscosity and flow parameters of 10 or 12.5% boiled milled rice slurries were estimated by Power Law Model with a Wells-Broodfield RVTCP microcone plate viscometer with 2.4 cm diam. 1.565° cone at 25°C and compared with data from other methods. Cooking of the sample was critical in obtaining reproducible results. Selected pairs of samples of similar amylose contents differing in cooked-rice texture properties by sensory and instrument methods differed also in Power Law parameters flow behaviour index *n* and consistency coeff. *m*. Apparent viscosity at 10 and 20 rpm may be used to index *m*, but not *n*. Differences in *m* and apparent viscosity were not always those predicted by other texture indexes. Alkali spreading value at adjusted KOH concn. may be useful in texture differentiation among rices with similar values in 1.7% KOH. AA

## Wheat

745

Fretzdorff (B), Zwingelberg (H) and El Baya (AW). **Studies on wheat germ stabilization.** *Getreide-Mehl und Brot* 45(4); 1991: 99-103 (De)

## Wheat starch

746

Zhang (W) and Jackson (DS). **Retrogradation behaviour of wheat starch gels with differing molecular profiles.** *Journal of Food Science* 57(6); 1992: 1428-1432

Differing molecular profiles of starches were developed by acid treatment of native wheat starch. Mol. wt. distribution, branching and linear chain length distribution was characterized. Starches with fewer large size amylopectin fragments, increased smaller size amylopectin fragments, decreased branch points, decreased overall sizes, and narrower linear chain length distributions, had higher initial retrogradation rates. However, all aged starch gels had similar final crystalline enthalpy levels. Different retrogradation behaviours were due to smaller size amylopectin fragments, narrowed linear chain length distribution, and decreased branching. Retrogradation behaviour



was modeled using classical Avrami kinetics to allow comparison with other retrogradation studies. AA

## MILLETS

### Corn

747

Maga (JA), Kim (CH) and Wolf (CL). **The effect of gellan gum addition on corn grits extrusion.** *Food Hydrocolloids* 5(5): 1991: 435-441

Corn grits with 15 and 25% moisture and added levels of 0, 0.01, 0.1 and 0.5% gellan gum were extruded using 1/1, 3/1 or 5/1 compression screws operating at 100 rpm at dough temp. 100, 150 or 200°C. Gellan addition did not significantly influence yield, density, expansion ratio and breaking strength but water absorption index increased with the gellan gum and significantly reduced the extruder torque. SD

### Sorghums

748

Lai (M-N), Chang (F-W) and Wang (H-H). **Application of pseudo-steady heat conduction model for solid state fermentation of sorghum mash.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 38(3): 1991: 226-234

Sorghum brewing is a Chinese traditional solid state fermentation, which has been carried out in three consecutive cycles in Taiwan. In order to understand the thermal properties of solid mash, the temp. profile of solid mash with water jacketed cylindrical fermentors was measured. The results were analyzed with one dimensional pseudo-steady heat conduction model with neglected heat convection. This model could be used for the estimation of fermentation heat of sorghum mash. In addition, it could be used to predict the optimal diam. of fermentors. Two consecutive fermentation with the cylindrical fermentors illustrates the production of 23.03 kg alcohol from 100 kg of sorghum grains which is generally obtained by 3 consecutive fermentation in the traditional process. AA

## PULSES

749

Bansal (KN). **Effect of levels of sulphur on the yield and composition of soybean (*Glycine max***

(L) Merr.). **greengram (*Vigna radiatus* L.), blackgram (*Vigna mungo* L.) and cowpea (*Vigna sinensis* L.).** *Madras Agricultural Journal* 78(5-8): 1991: 188-190

Effect of 4 levels of S viz., 0, 20, 40 and 80 kg S/ha in alluvial soils, on soybean, greengram, blackgram and cowpea were studied. Soybean, blackgram and cowpea showed higher yield than greengram. N, S, P and K contents were increased in soybean. GS

### African yam beans

750

Njoku (HO), Ofuya (CO) and Ogabulie (JN). **Production of tempeh from the African yam bean (*Sphenostylis stenocarpa* Hams).** *Food Microbiology* 8(3): 1991: 209-214

The suitability of the African yam bean (fermented with *Rhizopus microsporus*) as an alternative tempeh substrate was studied and the acceptability of the product as a filler for meat pie (a popular local snack) was evaluated. The product was organoleptically acceptable and the fermentation caused significant changes in the crude protein and total carbohydrate content of bean seeds. When used as a pie filler, there were significant taste differences between 'yam bean tempeh pie' and that of commercial beef meat pie ( $P < 0.05$ ). Of the different formulations, the pie made with ground yam bean tempeh was most acceptable. The results are important in the utilization of the African yam bean along new lines. SRA

### Chickpeas

751

Singh (T) and Tiwari (KN). **Effect of zinc application on yield and nutrient content in chickpea (*Cicer arietinum* L.).** *Madras Agricultural Journal* 79(2): 1992: 87-91

Effect of Zn application (0, 2.2 and 4.4 kg ha<sup>-1</sup>) in 3 var. of chickpea (K-850, K-468 and T-3) on yield; nutrient content and uptake of Anactinon; and contents of P, Fe, Cu and Mn in grain and straw was studied. Application of Zn significantly increased the yield and content and uptake of Zn, decreased the contents of P, Fe and Cu. The var. differed in yield potential, An content and uptake and content of other nutrients. GS

## Cowpeas

752

Tuan (Y-H) and Phillips (RD). **Nutritional quality of hard-to-cook and processed cowpea.** *Journal of Food Science* 57(6): 1992: 1371-1374

Hard-to-cook (HTC) defect was induced in cowpea seeds by storing at 37°C and 85% RH for 6 wk. HTC and control (stored at 7°C, 60% RH) seeds were boiled for 45 and 90 min or ground to flour. Flour was cooked as paste or extruded (20% H<sub>2</sub>O, 150°C). Overall dietary quality was estimated as Feed Efficiency and Relative Response Ratio. Protein quality was determined as Nitrogen Efficiency and Relative Nutritive Value. Overall and protein nutritional quality were generally higher for control than for HTC cowpea diets. Processing affected control and HTC seeds differently. Boiling either control or HTC whole seeds improved both overall and protein quality compared to raw seeds, while extrusion substantially increased the quality of control seeds but reduced the quality of HTC seeds. Cooking as paste improved protein and overall quality of control seeds but not protein quality of HTC seeds. AA

## Faba beans

753

Alka Sharma and Salil Seghal. **Protein and starch digestibility of faba bean in dependence on processing and cooking methods.** *Die Nahrung* 35(8): 1991: 891-893

Faba bean var. (VH-131 and WF) showed increased protein and starch digestibility due to soaking and cooking, but autoclaving for 25 min had max. beneficial effect. Sprouting had a remarkable effect on increasing starch digestibility especially in the WF var. BV

## French beans

754

Ramesh (GS), Kaushik (V) and Nirankar Nath. **Evaluation of blanching requirements of green French bean (*Phaseolus vulgaris* L.) pods on basis of thermal resistance of its peroxidase.** *Die Nahrung* 35(8): 1991: 817-820

Green pods of French beans CV. Pant Anupam were blended with distilled water, filtered and extract pH was adjusted to 5.25, 5.65, 5.85, 6.25 or 6.65 using 20% citric acid or 1 N NaOH. Thermal inactivation times (TIT) of peroxidase were determined by TIT tube method. The corrected F<sub>100</sub> [min] and z [°C] at the above 5 pH values were 1.77 and 15.8, 1.43 and

14.1, 0.95 and 11.0, 0.29 and 8.7 and 0.17 and 8.1 respectively. The corresponding energy of activation values were 157, 177, 218, 286 and 307 KJ mole<sup>-1</sup>. The actual blanching times in boiling media calculated from the above data were 4.0, 3.5, 2.5, 1.0 and 0.5 min, respectively, showing that blanching requirements of French beans decreased with increase in the pH of the blanching media. AA

## Kidney beans

755

Roozen (JP) and Johan de Groot. **Analysis of trypsin inhibitors and lectins in white kidney beans (*Phaseolus vulgaris*, var. Processor) in a combined method.** *Journal of the Association of Official Analytical Chemists* 74(6): 1991: 940-943

Buffered saline extraction, affinity chromatography, and Folin-BSA protein assay were used consecutively to provide a combined method for analysis of trypsin inhibitors and lectins in white kidney beans (*Phaseolus vulgaris*, var. Processor). The method was tested by following the decrease of both antinutritional factors by germination of the beans for 7 days at 20°C. Repeatability coeff. of variation were 2 - 7.4% for the trypsin inhibitors and 2.2 - 10% for the lectins. After 7 days of germination, trypsin inhibitors and lectins were reduced by 72 and 92%, respectively. AA

## OILSEEDS AND NUTS

756

Jain (PP), Suri (RK) and Mathur (KC). **Amino acid composition of deoiled meals from oilseeds of forest origin.** *Journal of the Oil Technologists Association of India* 24(1): 1992: 7-8

The protein content of deoiled meals of *Viburnum coriaceum* and *Wrightia tomentosa* were 25.9 and 35.59% respectively, and it contained almost all the essential amino acids except tryptophan and cystine. Deoiled meals of both the oilseeds are good sources of protein and amino acids. GS

## Almonds

757

Senesi (E), Rizzolo (A) and Sarlo (S). **Effect of different packaging conditions on peeled almond stability.** *Italian Journal of Food Science* 3(3): 1991: 209-218

Packaging and storage methods for peeled almonds were studied with the aim of lengthening their



storage potential, thus extending their marketing period. Packaging materials with different gas and light permeabilities, atm. inside the package and storage temp. were investigated. The stability of almonds stored up to 18 months was evaluated using physical (colour, texture and  $a_w$ ), sensory (colour, flavour and acceptance) and chemical analyses. The lipid fraction was evaluated for oxidation and changes in the content of the tocopherols, an endogenous antioxidant. The results indicated that almonds could be held for up to 9 months of storage without a serious loss in quality, whatever the packaging materials. Beyond this time, quality could be maintained only by using packaging material with low oxygen permeability and the use of refrigeration. Utilization of these techniques could significantly alter the almond market whether as a semi-finished product for industrial use or as a product for direct consumption. AA

## Coconuts

### Coconut protein

758

Rasyid (F), Manullang (M) and Hansen (PMT). **Isolation and characterization of coconut protein.** *Food Hydrocolloids* 6(3): 1992: 301-314

Simple centrifugal means of coconut protein (CP) separation showed higher recovery than cryoprecipitation fractionation which could be modified taking into account the particular amino acid profile to improve the yield. The distinct protein fraction associated with the 'cream' portion could be applied for emulsification of fat. CP does not possess the beany flavour like soy protein and could be used in food formulations after studying its functional properties. SD

## Cottonseeds

759

Sanni (AI) and Ogbonna (DN). **The production of owoh - a Nigerian fermented seasoning agent from cotton seed (*Gossypium hirsutum* L.).** *Food Microbiology* 8(3): 1991: 223-229

## Groundnuts

760

Singleton (JA) and Pattee (HE). **Maturity of storage affect freeze damage in peanuts.** *Journal of Food Science* 57(6): 1992: 1382-1384, 1411

The effect of maturity on the extent of freeze damage in peanuts (in the shell) was determined and the

concn. of anaerobic products during storage was monitored. Peanuts harvested at 6 different dates were artificially freeze damaged for 10 h at  $-4^{\circ}\text{C}$ . Conductivity of water extracts from freeze dried peanuts decreased with maturity as did the amount of K found in the leachates. Acetaldehyde and ethanol concn. in peanuts decreased during both maturity and storage. GS

## Groundnut pastes

761

Muego-Gnanasekharan (KF) and Ressurrecion (AVA). **Physicochemical and sensory characteristics of peanut paste stored at different temperatures.** *Journal of Food Science* 57(6): 1992: 1385-1389

When peanut paste was stored at 30, 40 and  $50^{\circ}\text{C}$  for up to 1 yr, that held at  $30^{\circ}\text{C}$  for 161 days had minimal deteriorative changes. At  $50^{\circ}\text{C}$ , the primary deterioration was increased browning, oxidized and cardboard flavours, and oil separation. Regression analysis indicated that ratings for chroma, cooked peanut, cardboard, and oxidized flavours were responsible for > 50% of the variation in response. When a detectable oxidized flavour was used as the indicator of storage deterioration, peanut paste had a predicted shelf-life of 152 days at  $30^{\circ}\text{C}$ ; 98 days at  $40^{\circ}\text{C}$ ; and 96 days at  $50^{\circ}\text{C}$ . AA

## Rapeseeds

762

Quinsac (A), Ribaillier (D), Elfakir (C), Lafosse (M) and Dreux (M). **A new approach to the study of glucosinolates by isocratic liquid chromatography. Part I. Rapid determination of desulphated derivatives of rapeseed glucosinolates.** *Journal of the Association of Official Analytical Chemists* 74(6): 1991: 932-939

## Soybeans

763

McNiven (MA), Grimmelt (B), Macleod (JA) and Voldeng (H). **Biochemical characterization of a low trypsin inhibitor soybean.** *Journal of Food Science* 57(6): 1992: 1375-1377, 1407

The biochemical characteristics of low trypsin inhibitor (LTI) soybean and the effects of heat treatment on their characteristics was studied. LTI soybeans required less heating compared to the conventional soybean in order to destroy trypsin inhibitors and chymotrypsin inhibitor activity. Electrophoresis, enzyme activity measurements and gel exclusion chromatography were used to

characterize LTI soybeans. The protein profiles were similar to that of control soybeans. However, the use of LTI soybean improved the economic viability of soybean as animal feed and human protein food supplements. GS

764

Pinto (VEF), Vaamonde (G) and Montani (ML). **Influence of water activity, temperature and incubation time on the accumulation of aflatoxin B<sub>1</sub> in soybeans.** *Food Microbiology* 8(3): 1991: 195-201

The effect of  $a_w$  temp. and incubation time on aflatoxin B<sub>1</sub> production by *Aspergillus parasiticus* NRRL 2999 in soybeans was determined in experimental conditions resembling post-harvest environments. Very low quantities of aflatoxin B<sub>1</sub> were detected at 15°C and 0.902 and 0.950. At this temp. and  $a_w$  0.990, competitive *Penicillium* growth was observed. The minimal  $a_w$  for aflatoxin B<sub>1</sub> production in this substrate was near 0.865. At this  $a_w$  level, very low quantities were observed at temp. above 20°C. At lower  $a_w$  values (0.801 and 0.750) no aflatoxin B<sub>1</sub> was detected at 15, 20, 25, 30 or 37°C. The optimal  $a_w$  for aflatoxin accumulation was 0.990, except at 37°C, in which case the optimum value was 0.950. There was a combined temp. and  $a_w$  effect, since the limiting  $a_w$  for aflatoxin production depends on the temp. The aflatoxin B<sub>1</sub> accumulation at different incubation times was greatly influenced by  $a_w$  and temp. At 20°C and an  $a_w$  of 0.950, aflatoxin B<sub>1</sub> increased with incubation time, at 30°C and an  $a_w$  of 0.990, toxin concn. decreased as the incubation time increased and at 37°C and an  $a_w$  of 0.950, it reached a max. and then decreased. AA

765

Sessa (DJ) and Nelsen (TC). **Chemical inactivation of soybean protease inhibitors.** *Journal of the American Oil Chemist's Society* 68(7): 1991: 463-470

This study aimed to optimize chemical treatments to destroy Kunitz (KTI) and Bowman-Birk (BBI) type protease inhibitors in model systems, and to destroy total trypsin inhibitor activity in soy flour. Time, temp., and reagent concn. were studied and 40 to more than 85% inactivation of KTI and BBI were observed by treatment with 0.6 mM Na<sub>2</sub>S<sub>2</sub>O<sub>5</sub>, 10 mM ascorbic acid + 0.8 mM CuSO<sub>4</sub> or 20 mM H<sub>2</sub>O<sub>2</sub> + 0.8 mM CuSO<sub>4</sub> at 65 - 90°C for 0.5 - 1 h. Upon treatment with Na<sub>2</sub>S<sub>2</sub>O<sub>5</sub>, KTI and BBI amino acid composition had no significant change. In contrast, AH + Cu<sup>2+</sup> treatment of both KTI and BBI markedly increased aspartic acid + asparagine and glutamic acid + glutamine contents, and significantly decreased histidine, tyrosine and methionine. With soy flour, only Na<sub>2</sub>S<sub>2</sub>O<sub>5</sub> effectively inactivated both

protease inhibitors. Steeping soy flour in 50 mM Na<sub>2</sub>S<sub>2</sub>O<sub>5</sub> at 65°C for 1 h inactivated about 98% BBI and 95% KTI. The information conveyed is basic to developing chemical methodology needed to inactivate both KTI and BBI protease inhibitors in soy protein products. AA

766

Che Man (YB), Wei (LS), Nelson (AI) and Yamashita (N). **Effects of soaking soybeans in dilute acids on biologically active components.** *Journal of the American Oil Chemist's Society* 68(7): 1991: 471-473

Lipoxygenase activity was completely eliminated by soaking in 0.3 M HCl at either 23 or 40°C for 8 h. < 50% trypsin inhibitor remained and urease was inactivated to an acceptable level (0.04 ΔpH). BV

## Soy products

### Soyball

767

Kanchana (S), Neelakantan (S) and Banumathi (P). **Studies on the formulation of high protein snack foods using soybean - 1. Sweet soyball.** *Indian Journal of Nutrition and Dietetics* 27(7): 1990: 213-219

Soyballs, a high protein sweet snack, is prepared with processed soydhal (500 g), jaggery (350 g), malted sorghum rava (100 g), liquid glucose (50 g) and flavouring agents like cardamom (0.5%), menthol (0.1%), dried ginger (0.5%) and vanilla essence (0.6%). Soyballs prepared from soaked, pressure cooked, dried and roasted dhal contained 21 g protein, 9 g fat, 55 g carbohydrate and 385 Kcal energy per 100 g, and had a shelf-life of 90 days. Prolonged soaking and cooking of dhal reduced the nutrient content. GS

### Tofu

768

Schaefer (MJ) and Love (J). **Relationships between soybean components and tofu texture.** *Journal of Food Quality* 15(1): 1992: 53-66

Relationship between protein, lipid, phytic acid, Ca, Cu and Fe from soybean, soy milk and tofu were examined. All except lipid in soybean showed significant correlation with the same component in soy milk, but only phytic acid, Cu and Fe showed significant correlation in soybeans and tofu (moist basis). On dry basis soybean and tofu protein showed a significant correlation of  $r = 0.93$ . The correlations between soybean phytic acid with tofu Ca,  $r = 0.90$ ; tofu Ca with hardness,  $r =$  tofu Ca with



springiness,  $r = 0.73$  and tofu protein with fraturability,  $r = 0.75$  were significant. Tofu produced from high protein var. Vinton/Vinton 81 was firmer and more springy texture than tofu prepared from Amsoy 71. Phytic acid may bind the Ca coagulant and alter the tofu structure, yield, composition and texture. SD

## Soy proteins

769

Genovese (MI) and Lajolo (FM). **Physicochemical properties of isolated soy proteins from normal, broken or damaged seeds.** *Journal of Food Science* 57(6): 1992: 1378-1381, 1411

The influence of seed quality on the yield and physicochemical properties (viscosity, gel-forming ability and emulsion stability) of isolated soy proteins was determined. Broken or damaged seeds affect the quality of products. Soy protein isolates (SPI) from altered seeds showed physicochemical properties less useful than those of normal seeds. SPI from damaged seeds mixed with those of normal seeds altered proportionally their gelation and water retention capacity of the gels. Viscosity or water absorbing capacity of SPIs is useful as indicators to evaluate quality. BV

770

Campbell (NF), Shih (FF) and Marshall (WE). **Enzymatic phosphorylation of soy protein isolate for improved functional properties.** *Journal of Agricultural and Food Chemistry* 40(3): 1992: 403-406

A commercial soy protein isolate (SPI) was phosphorylated using the catalytic subunit of a commercially available protein kinase from bovine cardiac muscle. On the basis of scintillation counting and autoradiography, incorporation of  $^{32}\text{P}_i$  into SPI increased with increased incubation time and reached a level of  $13\ \mu\text{mol}$  of phosphorus incorporated/g of protein after a 4 h incubation at  $37^\circ\text{C}$ . SDS-PAGE and autoradiography of timed protein kinase assays showed  $^{32}\text{P}_i$  initially incorporated into glycinin acidic polypeptides and then into glycinin basic polypeptides. Very little  $^{32}\text{P}_i$  was associated with the  $\beta$ ,  $\alpha/\alpha'$  subunits of  $\beta$ -conglycinin. Compared with nonphosphorylated SPI, the phosphorylated protein showed significantly improved solubility and emulsifying activity over a pH range of 3 - 6. Emulsion stability and foam expansion were also significantly improved with phosphorylation, but foam stability was lower using the phosphorylated protein. AA

## Sunflower seeds

771

Udayasoorian (C), Balamurugan (P) and Paramasivam (P). **Effect of N and P enriched sunflower stalk on crop yield, oil content and soil fertility.** *Madras Agricultural Journal* 78(5-8): 1991: 238-240

$\text{P}_2\text{O}_5$  enriched sunflower stalk used as an organic manure improved the physical condition and fertility status of soil; and recorded in all the 4 seasons significantly higher oil content over control from 39.3% to 40.0% in inorganic fertilizer treatment. 5%  $\text{P}_2\text{O}_5$  enriched stalk treatment yielded the max. oil, 535 kg/ha. GS

772

Balamurugan (P), Udayasoorian (C) and Ayyasamy (M). **Effect of magnetic seed treatment on sunflower seed yield and quality.** *Madras Agricultural Journal* 78(5-8): 1991: 294-295

Magnetic seed treatment did not significantly influence flowering, plant height, seed recovery wt. and oil content of sunflower (*Helianthus annuus* L.) in both the kharif and rabi seasons. Seeds treated with 5000 gauss recorded the highest seed yield, 1348 kg/ha in kharif and 1253 kg/ha in rabi seasons. GS

773

Chang (KC) and Miyamoto (A). **Gelling characteristics of pectin from sunflower head residues.** *Journal of Food Science* 57(6): 1992: 1435-1439

The textural properties of sunflower pectin (SP) using the standard sag method and the Instron textural profile method, under the near neutral pHs, were investigated and the gelling properties were compared with 2 types of commercial citrus low-methoxyl pectin (LMP). SP formed firm jellies in formulations with 0.60% sugar content with a wide range of  $\text{CaCl}_2$  (30 to 90 mg/g pectin) and sugar at pH 5.4 and 6.0. Strong interactions among the factors of pH, sucrose and Ca existed for all the three sources of pectin. The texture profile of SP was similar to that of the commercial citrus LMP and had a gel power of 110 compared to 100 and 120 for the other two sources. Sunflower pectin was found more useful in producing low-caloric foods due to its ability to form jellies at near-neutral pHs at low sugar concn. with neutral taste than the acidity and high sugar content required for the high methoxyl pectin to gel. GS

774

Miyamoto (A) and Chang (KC). **Extraction and physicochemical characterization of pectin from**

**sunflower head residues.** *Journal of Food Science* 57(6): 1992: 1439-1443

Sunflower head residues were treated with 0.75% sodium hexametaphosphate followed by acid precipitation for extraction of pectin; the yield of pectin was 7.3% of the head residues. The extracted pectin contained anhydrogalacturonic acid (89.2%), acetyl ester (2%), and neutral sugars (4.2%), mainly rhamnose and glucose). The degree of methylation was 38.5%. The pectin had a high viscosity (527 cp at 1% level) at pH 3, a high water-holding capacity (57 g water/g organic matter) and a high molecular size than commercial low-methoxyl-pectin. Sunflower head pectin has a high potential for commercial food applications. BV

## TUBERS AND VEGETABLES

### Cassava

775

Jaleel (SA), Srikanta (S), Ghildyal (NP) and Lonsane (BK). **Comparative efficiency of techniques for recovery of ethanol from pulpy substrate fermented in solid phase.** *Starch/Starke* 43(5): 1991: 183-186

The recovery of ethanol from fermented pulp of tapioca fibrous residues by hydraulic pressing in 3 stages with interstage water addition lead to 79.68% relative recovery but the concn. of the ethanol in the pooled extract was nearly 60.53% of that present in the fermented pulp. The lower concn. of ethanol in extract obtained by percolation technique and poor extraction efficiency associated with other recovery processes are unacceptable from economic point of view. AA

### Sugarbeet

776

Vijay Kumar and Zutshi (K). **Effect of different levels of nitrogen on the yield, nutrient uptake and quality components in juice of sugarbeet (*Beta vulgaris* L.).** *Madras Agricultural Journal* 78(5-8): 1991: 165-167

Application of N at 120 kg/ha increased the root and top yield, sugar yield and uptake of N by sugarbeet. Impurities, alpha amino-N and molassegenic compounds like Na and K in beet juice increased but sucrose content reduced with increasing dose of N. GS

### Potatoes

777

Anzaldúa-Morales, Bourne (MC) and Shomer (I). **Cultivar, specific gravity and location in tuber affect puncture force of raw potatoes.** *Journal of Food Science* 57(6): 1992: 1353-1356

Three potato cvs were sorted into sp. gr. groups. Slices of raw potato were subjected to a puncture test at 6 sites in the cortex tissue and 8 sites in the pith tissue. The cortex tissue generally showed 25 - 65% higher puncture force than the pith tissue. With exception of pith tissue in Monona cv. puncture force increased with increasing sp. gr. in cortex and pith for raw potato. Dry matter content increased with increasing sp. gr. The cortex tissue had 3 - 6% higher dry matter than pith tissue. AA

778

Mondy (NL), Seetharaman (K) and Munshi (CB). **Irradiation and packaging affect the nitrate-nitrogen concentrations of potatoes.** *Journal of Food Science* 57(6): 1992: 1357-1358

Russet Burbank and Kennebec potato cvs were irradiated with dosages of 0.1 and 1.0 KGy and stored in polyethylene or paper bags for 1 or 3 months at 5°C or 20°C. Tubers receiving irradiation showed a significant ( $p < 0.01$ ) increase in nitrate-nitrogen concn. as compared to controls. Those receiving the 1.0 KGy dose had the highest nitrate-nitrogen concn. Tubers stored in polyethylene bags were significantly ( $p < 0.01$ ) higher in nitrate-nitrogen concn. than those stored in paper bags. Tubers stored at 20°C were significantly ( $p < 0.01$ ) higher in nitrate-nitrogen than those stored at 5°C. These trends were consistent for both cvs. The cortex region was significantly ( $p < 0.01$ ) higher in nitrate-nitrogen concn. than the pith region. Kennebec tubers were significantly ( $p < 0.01$ ) higher in nitrate-nitrogen than the Russet Burbank tubers for all irradiation doses and storage temp. AA

779

Pinthus (EJ), Weinberg (P) and Saguy (IS). **Gel strength in restructured potato products affects oil uptake during deep-fat frying.** *Journal of Food Science* 57(6): 1992: 1359-1360

A controllable food system consisting of a restructured potato product was employed to study the effect of gel-strength on oil uptake. Water loss and oil uptake were affected markedly by gel-strength. Oil uptake decreased as gel-strength increased. The oil uptake ratio,  $U_R$  (wt. ratio of the oil uptake to the water evaporated during frying) was utilized to assess the effectiveness of reducing oil absorption during frying. This criterion was useful



for comparison of restructured potato products with different initial or final moisture contents. AA

780

Golachowski (A). **The properties of starch obtained from irradiated and at various temperatures stored potato tubers.** *Starch/Stärke* 43(5): 1991: 176-179 (De)

Potato tubers were either exposed to  $\gamma$ -irradiation (150 Gy) or not. They were stored at temp. of +4°C, +7°C and +13°C for 6 months. The properties of the starch obtained from the irradiated tubers after storage were different from the starch obtained from the tubers before storage and from the starch obtained from the tubers not exposed to  $\gamma$ -irradiation. Range and trends of changes in starch properties depended on the temp. of storage. AA

#### Potato starch

781

Janas (P). **Rheological studies on potato starch pastes at low concentrations. Part III: Simplified measurements of absolute characteristics of pasting.** *Starch/Stärke* 43(5): 1991: 168-171

Results of measurements of pasting characteristics of starch which are carried out in the rotatory viscometer with co-axial cylinders may be expressed in absolute viscosity units. The measurements can significantly be simplified if the rotor of the construction presented in this paper is applied. The rotor may play the role of a stirrer and the measurement cylinder at the same time. The work conditions (stirring - measurement) may be alternated, without any additional manipulations in the measurement system, only by a change of an angular velocity of the rotor. The rotor of the construction presented here can be also useful in rheology measurements of dispersion which sedimentates. AA

782

Janas (P). **Rheological studies on potato starch pastes at low concentrations. Part IV: Absolute measurements of the rheological properties of starch during gelatinization.** *Starch/Stärke* 43(5): 1991: 172-175

The method of absolute measurement of the rheological properties of starch suspensions during gelatinization is presented. It enables to determine the flow curves already in the early stage of the process. The studies were carried out on 1.5% aqueous suspension of potato starch. They have shown that just at the temp. of approx. 15°C above

the beginning of gelatinization the formed paste starts to behave as a shear-thinning liquid with the yield stress,  $\theta_y$ . The non-Newtonian effects increase as the temp. increases. Experimental data are satisfactorily described by the modified four-parameter power law:  $\theta = \theta_y + \theta_0(\dot{\gamma}/\dot{\gamma}_0)^n$ . The temp. dependence on  $n$ - and  $\theta_y$ -parameters univocally determine the evolution of rheological properties which are observed on experiment. This evolution is understood as the transformation of Newtonian liquid through a pseudoplastic liquid into a nonlinear viscoplastic one. AA

#### Sweet potatoes

783

Noda (T), Ohtani (T), Shiina (T) and Nawa (Y). **Semi-continuous hydrolysis of sweet potato raw starch by *Chalara paradoxa* glucoamylase.** *Journal of Food Science* 57(6): 1992: 1348-1352

Effect of preservatives was investigated on semi-continuous digestion of sweet potato raw starch by *Chalara paradoxa* glucoamylase which digests both raw and gelatinized starch. Potassium metabisulphite strongly inhibited raw starch digesting activity (RDA) although gelatinized starch digesting activity was only slightly inhibited. Potassium sorbate, among the preservatives examined, showed the weakest inhibition (below 10%) on RDA. In the presence of potassium sorbate, semi-continuous digestion of sweet potato raw starch in a 20L scale hollow fiber UF membrane pilot reactor proceeded efficiently at 30% (w/v) initial concn. of raw starch at pH 5.0 and 40°C. Glucose production was 5.7 to 6.0 g/h/L. AA

#### Vegetables

##### Cucumbers

784

Guillou (AA), Floros (JD) and Cousin (MA). **Calcium chloride and potassium sorbate reduce sodium chloride used during natural cucumber fermentation and storage.** *Journal of Food Science* 57(6): 1992: 1364-1368

Cucumber fermentation characteristics and pickle quality were evaluated in brines containing equilibrium concn. of 0 - 0.4%  $\text{CaCl}_2$ , 0 - 0.4% potassium sorbate and 0 - 10% NaCl. Changes in brine pH and acidity, cucumber texture and colour, coliforms, lactic acid and total bacteria, yeasts and molds were followed over time. Results indicated that cucumber spoilage would eventually take place if NaCl or potassium sorbate were not present in the brine. The presence of  $\text{CaCl}_2$  helped maintain

cucumber firmness. A synergistic action between NaCl, CaCl<sub>2</sub> and potassium sorbate was seen, which allowed good quality pickles to be produced when moderate amounts of all 3 components were present in the brine (5% NaCl, 0.2% CaCl<sub>2</sub>, 0.2% potassium sorbate). AA

## Tomatoes

785

Khachik (F), Goli (MB), Beecher (GR), Holden (J), Lusby (WR), Tenorio (MD), Barrera (MR). **Effect of food preparation on qualitative and quantitative distribution of major carotenoid constituents of tomatoes and several green vegetables.** *Journal of Agricultural and Food Chemistry* 40(3): 1992: 390-398

The major carotenoid constituents of extracts from several raw and cooked green vegetables (broccoli, green beans, spinach), red ripe tomatoes, and tomato paste have been identified and quantified by HPLC on a C<sub>18</sub> reversed-phase column. The predominant carotenoids in raw green vegetables were neoxanthin, violaxanthin, lutein epoxide, lutein,  $\alpha$ -carotene, and  $\beta$ -carotene. The carotenoids in tomatoes and tomato paste were lutein, 5,6-dihydroxy-5,6-dihydrolycopene, lycopene 1,2-epoxide, lycopene 5,6-epoxide, lycopene, neurosporene,  $\gamma$ -carotene,  $\zeta$ -carotene,  $\beta$ -carotene, phytofluene, and phytoene. The effect of various means of cooking on the levels of carotenoids in raw and cooked (microwaved, boiled, steamed, stewed) green vegetables and tomatoes has been extensively studied. It was shown that while the epoxycarotenoids were somewhat sensitive to heat treatment, lutein and hydrocarbon carotenoids such as neurosporene,  $\alpha$ - and  $\beta$ -carotene, lycopene,  $\zeta$ -carotene, phytofluene, and phytoene survived the heat treatments. AA

## Tomato paste

786

Sandoval (AJ), Barreiro (JA) and Mendoza (S). **Thermal resistance of *Bacillus coagulans* in double concentrated tomato paste.** *Journal of Food Science* 57(6): 1992: 1369-1370

Thermal resistance was determined on a strain of *B. coagulans* in double conc. tomato paste ( $a_w = 0.95$  at 23°C, pH = 4.0, 30.3°Brix, 70.1% moisture and acidity 1.30 g/100g citric acid). A microsyringe method was used with an inoculum of  $1.3 \times 10^4$  spores/mL. Values of  $D_{90^\circ\text{C}} = 3.5$  min and  $z = 9.5^\circ\text{C}$  were obtained. AA

## FRUITS

787

Ali (SL) and Mazumdar (BC). **Studies on pectin content of some fruits and plant parts.** *Science and Culture* 57(10-11): 1991: 256

Pectin content of onion husk, water-chestnut husk, garlic husk, petiole of betelvine, flowers of *Bombax malabarica*, bael pulp and ber pulp were determined. Weighed quantity of representative samples was pulped and boiled for 35 - 40 min with double the quantity of distilled water. The slurry was filtered after cooling to room temp. The filtrate was mixed with 90% alcohol of equal vol., stirred well and maintained at low temp. for an h. The gel p.p.t. was filtered through previously weighed filter paper and the filter paper containing p.p.t. was dried (60-65°C) to determine the dry wt. of the pectin precipitated. GS

788

Hubinger (M), Memegalli (FC), Aguerre (RJ) and Suarez (C). **Water vapour adsorption isotherms of guava, mango and pineapple.** *Journal of Food Science* 57(6): 1992: 1405-1407

The sorption isotherms of guava, mango and pineapple for a range of  $a_w$  using a hygrometric method, and the effect of temp. on the equilibrium data at 25 and 50°C were determined. Temp. had no effect on the isotherms, in all the 3 fruits. Mango and pineapple showed higher sorption capacity than guava due to sugar contents of the fruits. GS

789

Alvarado (JDD). **Specific heat of dehydrated pulps of fruits.** *Journal of Food Process Engineering* 14(3): 1991: 189-195

Specific heat of dehydrated pulps, which were obtained from 31 different fruits at several moisture contents was determined by the indirect mixing method. Data are reported for each fruit. They confirm the application of linear functions, especially at moisture contents above 50%. An exponential regression equation for calculation of specific heat in the whole range of moisture content was established using all the values. AA

## Mandarin oranges

790

Rillo (L), Castaldo (D), Giovane (A), Servillo (L), Balestrieri (C), Quagliuolo (L). **Purification and properties of pectin methylesterase from mandarin orange fruit.** *Journal of Agricultural and Food Chemistry* 40(4): 1992: 591-593



Pectin methylesterase has been purified to homogeneity from mandarin orange according to a technique which employs an affinity chromatography step on heparin-Sepharose. The purified enzyme has a mol. wt. of 37000 and consists of a single polypeptide chain. Its  $K_m$  toward the citrus pectin is 0.84 mg/mL with a  $V_{max}$  of 0.38  $\mu$ mol of acid produced/min. The enzyme exhibits a pH optimum around 9, and 50% inactivation occurred in 1 min at 62°C. The protein is found to be glycosylated, and its amino acid composition has been reported. AA

## Pineapples

791

Umano (K), Hagi (Y), Nakahara (K), Shoji (A) and Shimamoto (T). **Volatile constituents of green and ripened pineapple (*Ananas comosus* [L.] Merr.)**. *Journal of Agricultural and Food Chemistry* 40(4): 1992: 599-603

Volatile constituents of green and ripened pineapples were isolated and identified by GC and GC/MS. The numbers of volatiles found were 144 and 127 in green and ripened pineapples, respectively. Among a total of 157 constituents identified, 50 were identified for the first time from pineapple. Esters constituted over 80% of total volatiles from both green and ripened pineapples. The major volatile constituents in green pineapples were ethyl acetate and ethyl 3-(methylthio)propanoate. In ripened pineapples, ethyl acetate and butane-2,3-diol diacetate were the main constituents. Diastereoisomers of butane-2,3-diol diacetate were satisfactorily separated by a GC chiral column. AA

792

Shafiur Rahman (Md) and Lamb (J). **Air drying behaviour of fresh and osmotically dehydrated pineapple**. *Journal of Food Process Engineering* 14(3): 1991: 163-171

Fick's Law of diffusion was used in the analysis of the air drying behaviour of fresh (non-osmosed) and osmosed pineapple. The drying rates of osmosed pineapples were significantly decreased due to the presence of infused solute. The effective diffusion coeff. decreased with increasing solid gain during osmosis. AA

## Sweet cherries

793

Mattheis (JP), Buchanan (DA) and Fellman (JK). **Volatile compounds emitted by sweet cherries**

(*Prunus avium* cv. Bing) during fruit development and ripening. *Journal of Agricultural and Food Chemistry* 40(3): 1992: 471-474

Volatile compounds were collected using headspace sampling from intact sweet cherries. Samples were collected at weekly intervals during fruit development and during a 7-day ripening period following harvest at commercial maturity. Thirty-one compounds of several chemical classes were identified including aldehydes, alcohols, esters, a ketone, a volatile acid, and a terpene. Of the compounds identified, ethanol had the highest concn., but the amounts varied considerably among harvest dates. A number of compounds were detected in all the samples, while stage of development determined the presence of other compounds. Several esters were detected only during the ripening period following harvest at commercial maturity. AA

## CONFECTIONERY, STARCH AND SUGAR

794

Bopaiah (BM) and Shantaram (MV). **Influence of season and drying temperature on the quality of cocoa beans**. *Indian Cocoa, Arecanut* 15(2): 1991: 37-39

Quality of cocoa beans (*Theobroma cacao* L.) in dry and wet seasons and the changes in temp. and pH during fermentation and drying were studied. The dry cocoa beans were analysed for bean acidity (pH), 100 bean wt. (g), moisture content (%) and shell content (1%). Results indicated that 65 plus or minus 5°C is the optimum artificial drying temp. Sun-dried beans were superior having low acidity (5.42 pH) as compared to artificial dried beans (5.04 pH). The wet season beans were smaller in size with higher shell content and lower pH than the dry season beans. Drying of fermented beans at higher temp. resulted in inferior quality beans. GS

795

Serghat (S), Mathlouthi (M), Hoopman (T) and Birch (G). **Solute-solvent interactions and the sweet taste of small carbohydrates. Part I: Effect of solvent polarity on solution properties**. *Food Chemistry* 45(1): 1992: 25-32

The physicochemical properties of D-glucose, D-fructose and sucrose in ethanol-water binary solvent showed different behaviour from that observed in water, as a pronounced effect of ethanol on water structure, probably because of ethanol's hydrophobic effect. In the binary solvent, D-fructose showed a clear difference from other two sugars. The results are useful to interpret the effect

of solvent polarity on the sweet taste of small carbohydrates. SD

796

Ajay Singh and Padmakar. **Enhanced production of glucose by enzymatic hydrolysis of chemical and irradiation-pretreated cellulosic materials.** *Die Nahrung* 35(8): 1991: 887-889

Hydrolysis of natural cellulosic substrates with improved yields of glucose can be achieved by using combined pretreatment of substrate with sodium chlorite and UV irradiation. BV

## Confectionery

797

Cebula (DJ) and Smith (KW). **Differential scanning calorimetry of confectionery fats. Pure triglycerides: Effects of cooling and heating rate variation.** *Journal of the American Oil Chemist's Society* 68(8): 1991: 591-595

Differential scanning calorimetry (DSC) measurements of the crystallization and melting phenomena of pure forms of the 3 principal triglycerides present in cocoa butter and related confectionery fats are presented. The results are used to exhibit the usefulness of the DSC technique for potential application in quality control of these types of material, but also as a warning of the difficulties in interpretation of data. The results also serve as a reference for future use in DSC studies of similar materials. AA

## Honeys

798

Huhtanen (CN).  **$\gamma$ -radiation resistance of *Clostridium botulinum* 62A and *Bacillus subtilis* spores in honey.** *Journal of Food Protection* 54(11): 1991: 894-896

Irradiation D values for the natural bacterial flora of 2 samples of raw (bulk) honey were 7.50 and 1.91 kGy; for 2 samples of retail honey the D values were 5.66 and 3.49 kGy. Irradiation D values of *Cl. botulinum* 62A spores inoculated into 3 honey samples and into water were respectively, 8.11, 9.38, 12.77 and 2.07 kGy. Similar D values for *B. subtilis* spores were 3.42, 3.35, 4.00 and 1.43 kGy. The radiation resistance of *Cl. botulinum* and *B. subtilis* spores in honey and in sugar syrups was a function of water content. AA

## Starches

799

Gruchala (L) and Pomeranz (Y). **Raw-starch degrading amylase(s) affect enzyme-resistant starch.** *Journal of Food Science* 57(6): 1992: 1433-1434

Enzyme-resistant starch (RS) was degraded, in part, by amylase(s) that act on raw starch. The degradation (solubilization) was accompanied by changes in several characteristics (peak temp. and enthalpy) and, probably, by the presence of a lipid-amylase complex. The degradation resulted in a significant reduction in one of the two main continuous peaks of RS around 155°C. AA

800

Asp (N-G) and Bjorck (I). **Resistant starch.** *Trends in Food Science and Technology* 3(5): 1992: 111-114

This review covers the difficulties involved in defining, quantifying and determining the physiological effects of resistant starch. Aspects included are starch association with dietary fibre, nature and sources, fate, analysis and labelling of resistant starch. 35 references. BV

801

Chinnaswamy (R) and Hanna (MA). **Extrusion-grafting starch onto vinyl polymers.** *Starch/Stärke* 43(10): 1991: 396-402

This review outlines the rationale behind starch polymer based thermoplastic resin production using reactive extrusion processing techniques as well as characterization of these polymers. 26 references. BV

## Sugar

802

Zunft (H-J) and Schulze (J). **Lactose - a potential dietary fibre. On the regulation of its microecological efficiency in the intestinal tract. Part 2. Nutrient effect of lactose.** *Die Nahrung* 35(8): 1991: 867-886 (De)

## Sugarcanes

803

Bangar (KS) and Sharma (SR). **Effect of foliar application of micronutrients on growth, yield and quality of sugarcane.** *Indian Sugar* 42(4): 1992: 211-213

Foliar application of commercially produced multimicro nutrient (Pushti, Agromin, multiplex and Micron A), and single micronutrients (FeSO<sub>4</sub>.



ZnSO<sub>4</sub>, MnSO<sub>4</sub> and CuSO<sub>4</sub>) were tried in a field exp. on Co 7318 sugarcane cv. in 1989-90 and 1990-91 at Sehora, Madhya Pradesh. The field had clay loam soil, pH 7.4, 0.55% organic carbon, 200 kg/ha available nitrogen, 20 kg/ha available P<sub>2</sub>O<sub>5</sub> and 395 kg/ha available K<sub>2</sub>O. Pushti and Agromin produced 14.2% and 11.7% higher yield of sugarcane, and improved juice quality. Single micronutrients also proved beneficial for sugarcane productivity. SRA

804

Nasir Ahmed (S), Chinnaswami (KN) and Kumaraswamy (K). **Efficacy of modified forms of urea and methods of application on the yield and quality of sugarcane.** *Indian Sugar* 42(4); 1992: 227-229

Field experiments conducted during 1986-87 and 1987-88 on sandy loam soils at Cuddalore, to optimise the nitrogen level and to evaluate the efficacy of forms of urea like urea super granule, neem cake blended urea and neem oil coated urea and 2 methods of application top dressing on the surface and placement at a depth of 10 - 15 cm, for sugarcane crop, showed that millable cane production at 200 kg N ha<sup>-1</sup> as urea super granule was significantly higher than 275 kg N ha<sup>-1</sup> as prilled urea application in both the yr of study. Placement of nitrogenous fertilizers at 10 - 15 cm depth in the soil along the plant rows effective than top dressing on the soil surface. SRA

## BAKERY PRODUCTS

805

Nochera (C) and Caldwell (M). **Nutritional evaluation of breadfruit - containing composite flour products.** *Journal of Food Science* 57(6); 1992: 1420-1422, 1451

Composite flours containing wheat, breadfruit flour and soy protein, whey or peanut meal were formulated and incorporated into Western style bread and biscuits. Bread containing 10% breadfruit flour and 5% whey, and biscuits containing 10% breadfruit flour and 5% soy protein were judged most acceptable in flavour, colour, and texture. Breadfruit flour contained 4.4% protein and was lower in sulphur containing amino acids and higher in lysine than wheat flour. Breadfruit containing bread and biscuits had low amino acid scores. The protein efficiency ratio (PER) of the biscuit product, however, was similar to that of the casein control while PER of bread was significantly lower. Results suggest that acceptable products can be made with composite flours containing 10% breadfruit flour. AA

806

Heikes (DL). **Mass spectral identification and gas chromatographic determination of chlorinated bleaching adducts in flour-containing food items.** *Journal of Agricultural and Food Chemistry* 40(3): 1992: 489-491

Bakery products and other flour-containing food items from the Food and Drug Administration's Total Diet Program were found to contain a series of unusual halogenated compounds when analyzed by a procedure designed for the GC deten. of chlorophenoxy alkyl acid herbicides as their methyl esters. These compounds were shown to occur in bleached flours and were not present in unbleached flours thus, they were assumed to be flour-bleaching adducts. GC-MS with chemical ionization (ethylene oxide) proved useful for the characterization of chlorinated derivatives of indigenous fatty acids: oleic, (Z)-9-octadecenoic acid, and linoleic, (Z,Z)-9,12-octadecadienoic acid. Thus, 9,10-dichlorooctadecanoic acid, 9,10-dichloro-12-octadecenoic acid, 12,13-dichloro-9-octadecenoic acid, 9,10,12,13-tetrachlorooctadecanoic acid, 9-chloro-10-hydroxyoctadecanoic acid, 10-chloro-9-hydroxyoctadecanoic acid, isomers of chlorohydroxyoctadecenoic acid, and isomers of trichlorohydroxyoctadecanoic acid were identified and determined in several food items (breads, cakes, muffins, cookies, crackers, etc.). The most prominent residue was that of 9,10-dichloro-12-octadecenoic acid. Levels found in chocolate cake, yellow cake, and coffee cake commonly exceeded 20 p.p.m. AA

## Bread

807

Collar (C), Mascaros (AF) and de Barber (CB). **Amino acid metabolism by yeasts and lactic acid bacteria during bread dough fermentation.** *Journal of Food Science* 57(6); 1992: 1423-1427

Metabolism of 22 free amino acids (AA) during fermentation (early and later steps) of wheat dough samples started with pure and associated cultures of yeast and lactic acid bacteria, and commercial compressed yeast (CY) were investigated. Unfermented and fermented straight doughs were studied by Reversed-Phase HPLC of their dansyl derivatives. Used as starters were strains of *Saccharomyces cerevisiae*, *Lactobacillus brevis*, *Lact. plantarum* and *Enterococcus faecium*. Statistical data analysis indicated clustering of samples with yeast and samples without yeast (including uninoculated doughs) respectively, based on rate of metabolism of acidic, basic, aliphatic and aromatic AA. Differences in AA metabolism during



the later fermentation step (DF2) categorized bacterial starters into groups according to balance between degree of assimilation ( $DF2 < 0$ ) and exoproteolytic release ( $DF2 > 0$ ) of AA. AA

808

Weipert (D). **Uniaxial and biaxial tensile tests with wheat bread doughs. Part 1: Dough preparation for the measurements with the extensograph and alveograph.** *Getreide-Mehl und Brot* 45(4); 1991: 103-108 (De)

809

Luther (G). **Dough characteristic and baking machines.** *Getreide-Mehl und Brot* 45(4); 1991: 108-112 (De)

810

Zanoni (B) and Petronio (M). **Effect of moisture and temperature on the specific heat of bread.** *Italian Journal of Food Science* 3(3); 1991: 239-242

The specific heat of bread crust and crumb ( $CP_b$ ) was determined by differential calorimetric analysis by varying temp. ( $v$ ) and moisture ( $X_w$ ), in the ranges of 25 - 120°C and 0 - 44%, respectively. It was reconstructed by combining the specific heat of water and that of a generic dried component, that were respectively found to be quadratic and linear functions of temp. AA

## Cakes

811

Hegazy (NA), Mekawy (AA) and Hassona (HZ). **Influence of different levels of peanut hull flour on physical and sensory evaluation of low calorie cakes.** *Die Nahrung* 35(8); 1991: 821-826

Low calorie cakes were prepared using groundnut (peanut) hull flour (GHF 49% fibre) by replacing wheat flour and subjected to physical and sensory evaluations. Cakes prepared with 30% GHF was less acceptable compared to those prepared with 10 and 20% which were closer to control cakes. Reduced levels of plasma total lipids for rats fed the cakes containing 30% GHF (-6.34%) was noticed compared to those containing 10% or control which showed increasing levels for plasma total lipids (7.14% and 16.9%) respectively). Impaired growth was noticed with decreasing levels of total lipids. The present study indicates that GHF could be useful for preparation of dietetic foods of potential value for those suffering from hyperlipidemia. BV

## Cookies

812

Yamamoto (Y), Sogo (N), Iwao (R) and Miyamoto (T). **Antioxidant activity of egg yolk during baking and storage of cookies.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 38(3); 1991: 184-188 (Ja)

The effects of whole egg, egg albumen or egg yolk on the lipid oxidation of cookies during baking and storage were investigated. Cookies which were prepared with linoleic acid by 40% (wt. % to the wheat flour) were oxidized markedly during cooking and storage at 40°C for 7 days. When whole egg or egg yolk was added by 50% of the wt. of the wheat flour for the preparation of cookies with linoleic acid, the lipid oxidation was suppressed entirely. The cookies containing linoleic acid were also prevented against oxidation during storage by the addition of egg albumen by 50% or whole egg or egg yolk by 25% or more. When cookies were prepared with lard not containing tocopherols by 75%, the lipids were oxidized weakly during baking and storage at 40°C for 10 days. When the cookies containing lard without tocopherols were prepared with the whole egg or egg yolk by 25% or more, the lipid oxidation was suppressed, and the cookies were also prevented against oxidation during the storage by the addition of egg albumen by 50% or whole egg or egg yolk by 25% or more, similar to the case of linoleic acid containing cookies. The cookies which were prepared with commercially available lard by 75% were not oxidized at all during baking, and also prevented against oxidation during storage at 40°C for 4 wks. The slight lipid oxidation of the cookies after 6 wks storage was suppressed entirely by the addition of egg albumen by 50% or the whole egg or egg yolk by 25% or more. AA

## Pasta

813

Seiler (W). **Mixing, kneading and pressing of raw material during pasta production.** *Getreide-Mehl und Brot* 45(4); 1991: 117-127 (De)

## MILK AND DAIRY PRODUCTS

814

Namasivayam (C) and Ranganathan (K). **Treatment of dairy waste using red mud.** *Research and Industry, India* 37(3); 1992: 165-167

Dairy industries dispose large quantity of water used for washing of cans, equipments and floor. This waste water is effectively treated with a flocculant, red mud to protect the aquatic and soil environment. Red mud removed 77, 71, 65, 73 and 95% of



turbidity, BOD, COD, oil and grease and bacterial count respectively at a dosage of 1304 mg/l of effluent compared to 94, 80, 86 and 93% respectively for alum treatment at a dosage of 476 mg/l of effluent. The red mud produces lower sludge vol. and also it is economical. BV

## Milk

815

Elsamma Job, Thomas (EK) and Karayalar (KS). **Economics of milk production in homesteads - a case study in Trivandrum district.** *Madras Agricultural Journal* 79(1); 1992; 24-27

Itemwise breakup of costs and returns per cow and buffalo between two calvings revealed that the major cost was feed 94.44% for buffaloes and 93.05% for cows. Annual av. milk yield per animal and cost of production per l were 1217 l, Rs. 5.51 for buffaloes and 1989 l, Rs. 4.09 for cows respectively. GS

816

Nakajima (H), Suzuki (Y), Kaizu (H) and Hirota (T). **Cholesterol lowering activity of ropy fermented milk.** *Journal of Food Science* 57(6); 1992; 1327-1329

The effect of ropy fermented milk on serum cholesterol in rats was studied. Basic diets containing slime-forming *Lactococcus lactis* subsp. *cremoris* SBT 0495, its non slime-forming variant SBT 1275, and acidified reconstituted skim milk, with 0.5% cholesterol added, were fed to F-344 rats for 7 days. Serum cholesterol level of rats fed the ropy fermented milk were the lowest among the three treatments. The serum high-density lipoprotein (HDL) cholesterol/total cholesterol ratio of rats fed ropy fermented milk was the highest. Slime materials produced by *L. lactis* subsp. *cremoris* SBT 0495 had a beneficial effect on rat cholesterol metabolism. AA

817

Troyano (E), Martinez-Castro (I) and Olano (A). **Kinetics of galactose and tagatose formation during heat-treatment of milk.** *Food Chemistry* 45(1); 1992; 41-43

Milk was heated at 115 - 135°C. A first order kinetic model was satisfactorily used to describe the formation of the carbohydrates. From the Arrhenius plot, the activation energies were 113 kJ/mol for galactose and 115 kJ/mol for tagatose whose formation took place only under sterilization conditions and whose presence in commercial milk indicated the severity of the heat-treatment. SD

818

Patel (JR), Dave (JM), Dave (RI) and Sannabhadti (SS). **Effect of feeding milk fermented with mixed culture of human strains of lactobacilli on faecal lactobacilli and coliform counts in human test subjects.** *Indian Journal of Dairy Science* 45(7); 1992; 379-382

819

Coulibaly (K) and Jeon (IJ). **Solid-phase extraction of less volatile flavour compounds from ultrahigh-temperature processed milk.** *Journal of Agricultural and Food Chemistry* 40(4); 1992; 612-616

A rapid and sensitive, solid-phase extraction method was developed to isolate relatively nonvolatile flavour compounds from ultrahigh-temp. (UHT) milk. Various solid-phase materials were investigated including activated carbons, C<sub>18</sub> reversed-phase silica, Florisil, and silica gel. The solid-phase materials packed in small columns (5-mL glass syringes) were treated with various solvents and loaded with the milk samples. Then, the compounds retained in the columns were eluted with methylene chloride and analyzed by GC or GC-MS. Results indicated that the combination of activated carbon and C<sub>18</sub> reversed-phase silica was the most effective in isolating relatively nonvolatile flavour compounds from UHT milk. Recoveries of the lactones added to milk were as low as 30 p.p.b., and reproducibility of the method appeared to be acceptable according to the coeff. of variation. AA

820

Nieuwenhuijse (JA), Sjollem (A), van Boekel (MAJS), van Vliet (T) and Walstra (P). **The heat stability of concentrated skim milk.** *Netherlands Milk and Dairy Journal* 45(3); 1991; 193-224

## Milk powders

821

van Mill (PJJM) and Jans (JA). **Storage stability of whole milk powder: Effects of process and storage conditions on product properties.** *Netherlands Milk and Dairy Journal* 54(3); 1991; 145-167

822

Baldwin (AJ) and Ackland (JD). **Effect of preheat treatment and storage on the properties of whole milk powder. Changes in physical and chemical properties.** *Netherlands Milk and Dairy Journal* 45(3); 1991; 169-181

Whole milk powders (WMPs) were manufactured with different preheat treatments, the experiment

being replicated during the dairying season. The effects during storage were evaluated. There was a very small effect of preheat treatment on moisture content. Sulphydryl (SH) groups and hydroxymethylfurfural (HMF) were affected by both preheat temp. and preheat holding time. In contrast, the solubility index (SI) was significantly affected by preheat holding time only. Thus detrimental effects on SI can be mitigated by using a high temp. short time treatment. During the storage trial of 12 months' duration, moisture content showed a small increase, HMF increase by a factor of 3 (approx.) and SH groups exhibited a small decrease. The SI increased, and the increase was greater for powders with high initial values arising from a high preheat treatment. The relationships between the chemical species measured, particularly SH and HMF, and the rate of development of oxidized aroma and flavour are discussed. The intensity of heat treatment given in the manufacturing process can be gauged using the whey protein nitrogen index test. When WMP is stored in air, high preheat treatment can extend the time before oxidized flavour becomes evident. However, the potentially detrimental effects of high preheat treatment must be taken into account. AA

## Milk products

823

Katiyar (SK), Bhasin (AK) and Bhatia (AK). **Traditionally processed and preserved milk products of Sikkimese tribes.** *Science and Culture* 57(10-11): 1991; 256-258

Chhurpi - a cheese like product prepared from milk of cow-yak (a cross between male yak and cow), is an important diet for the Sikkimese tribes. Hot milk is curdled and drained and spread over a tray or filled in a jute bag and kept under heavy wt. to squeeze out residual water. The hard mass obtained is sliced into cubes, sun dried and chewed like betel nuts. Chhurpi processing, preservation techniques, composition and nutritive value are given. The product is a rich source of protein (53.4 - 57.6%), fat (11.2 - 12.3%) and carbohydrate (20.4 - 23.2%) and is highly nourishing. GS

## Cheese

824

Zottola (EA) and Smith (LB). **Pathogens in cheese.** *Food Microbiology* 8(3): 1991; 171-182

This paper reviews the recent literature with respect to the occurrence of pathogens in cheeses produced commercially and in some instances in the home. Aspects covered are the history of surveillance, establishment of standards, sources of pathogens

contaminating milk used for cheesemaking, number of outbreaks, types of cheese involved, and microorganisms implicated. 45 references. SRA

825

Kim Ha (J) and Lindsay (RC). **Contributions of cow, sheep, and goat milks to characterizing branched-chain fatty acid and phenolic flavours in varietal cheeses.** *Journal of Dairy Science* 74(10): 1991; 3267-3274

Selected goat milk (fresh, semi-soft), sheep milk (Pyrenees, Roquefort), and cow milk (Blue, Cheddar) cheeses were analyzed for FFA using a sensitive GC technique. Qualitative profiles for most FFA were similar in the samples, except that 4-ethyloctanoic acid was not found in cow milk cheese. Milk fat of cows contained low concn. of 4-methyloctanoic acid, but milk fat of sheep and goat contained significant amounts of both 4-methyloctanoic and 4-ethyloctanoic acids, which contributed mutton-like and goat-like flavours, respectively. Pyrenees sheep milk cheese contained significant amounts of methyl- and ethyl-substituted phenols, which contributed characterizing sheep-like flavour notes to this cheese variety. AA

826

Iametti (S), Negri (E), Bonomi (F) and Giangiacomo (R). **A spectrofluorimetric approach to the estimation of changes in protein surface hydrophobicity during cheese ripening.** *Netherlands Milk and Dairy Journal* 45(3): 1991; 183-191

A method was devised to investigate protein surface hydrophobicity in the course of ripening of the Italian soft cheese, Taleggio. The method relies on mild homogenization of cheese and on the spectrofluorimetric titration of surface hydrophobic sites on the proteins in the dispersed cheese samples with the fluorescent hydrophobic probe, 1,8-anilinonaphthalenesulphonate. Results of these titration can be expressed in terms of affinity and of the number of sites available to the fluorescent probe on the surface of accessible proteins. Figures obtained from such titrations during the course of cheese ripening were compared with proteolytic indices, derived both from soluble nitrogen measurements and from SDS-PAGE patterns. No direct relationship was found between the extent of ripening, as determined by an analytical measurements, and the events detected by the spectroscopic method. As a control, cheeses were also made under conditions leading to limited proteolysis, i.e. by using a low-activity bacterial inoculum and by increasing the height of the moulds. In these conditions, proteolysis and changes in protein surface hydrophobicity were



considerably slowed down. A relationship was found between the surface hydrophobicity of cheese proteins at the beginning of the ripening process and the extent of subsequent ripening of the cheese. AA

## Cheddar cheese

827

Subramanian (P), Malik (RK) and Mathur (DK). **Protein breakdown in Cheddar cheese made from buffalo milk. I. Total and soluble nitrogen fractions.** *Indian Journal of Dairy Science* 45(7): 1992: 360-365

The total nitrogen (TN) content in cheese was not significantly affected by the type of milk or the starter culture used. The TN increased from initial 4.12% to 7.13% after 9 months in cow milk cheese and from 4.02% to 7.14% in buffalo milk cheese prepared with LF-40 starter. The corresponding values for the starter culture CH-9 were 4.17 to 7.79 and 4.00% to 7.74%. Buffalo milk Cheddar cheese prepared with either of the two starter had relatively higher levels of TN after 12 months of ripening. The release of soluble nitrogen (SN) as a function of ripening time was on an exponential pattern in cow milk cheese prepared with LF-40 starter, increasing from the initial 0.26% to 3.10% after 12 months. The values of SN in buffalo milk cheese were lower than those in cow milk cheese. The rate and extent of proteolysis in terms of tyrosine released in cow milk cheese was higher than buffalo milk cheese. SRA

828

Subramanian (P), Mathur (DK) and Malik (RK). **Protein breakdown in Cheddar cheese made from buffalo milk. II. Polyacrylamide gel electrophoretic profile.** *Indian Journal of Dairy Science* 45(7): 1992: 366-369

The electrophoretic studies revealed that while the degradation of  $\alpha$ -s<sub>1</sub> casein, initiated at 3 months of ripening was complete by 9 months in LF-40 cow milk cheese, a part of it still remained undegraded in LF-40 buffalo milk cheese and CH-9 cow and buffalo milk cheeses even after 12 months of ripening. The breakdown of  $\alpha$ -s<sub>1</sub> casein in buffalo Cheddar cheeses started only after 6 months. It was degraded faster than  $\beta$ -casein in all cases with the result that the major part of  $\beta$ -casein still persisted in cheese ripened for 12 months. The electrophoretic bands representing the casein breakdown products were more in cow milk cheese than in buffalo Cheddar cheese. Between the two starters, LF-40 afforded higher degradation products. AA

829

Subramanian (P), Mathur (DK) and Malik (RK). **Protein breakdown in Cheddar cheese made from buffalo milk. III. Separation, isolation and amino acid analysis of peptides.** *Indian Journal of Dairy Science* 45(7): 1992: 370-378

Gel filtration of TCA soluble extracts revealed that the number of peptides was the same initially both in LF-40 and CH-9 cow and buffalo milk Cheddar cheeses. Differences in the peptide patterns were, however, observed in the cheeses prepared from the two types of milk during ripening. But not very significant differences were noticed due to the two starter cultures used. The intensity of the additional peptide peaks, arising from the fragmentation of larger peptides increased with the time of ripening but it was comparatively low in buffalo milk cheeses. No appreciable difference in the number of different amino acids was observed in 2% TCA soluble peptides isolated at different stages of ripening from cow and buffalo milk Cheddar cheeses prepared with the two starter cultures LF-40 and CH-9. AA

830

Stratton (JE), Hutkins (RW) and Taylor (SL). **Histamine production in low-salt Cheddar cheese.** *Journal of Food Protection* 54(11): 1991: 852-855, 867

To assess the potential for histamine production in low-salt Cheddar cheese, pasteurized milk was inoculated with *Lactobacillus buchneri* St2A at levels of  $10^2$ ,  $10^3$  and  $10^4$  microorganisms per ml of milk. One additional vat was uninoculated and served as a control. Milk was then manufactured into low-salt (0.40%) Cheddar cheese. After 180 days of aging at 7°C, levels of *L. buchneri* St2A had increased approx. 100-fold in the inoculated cheese. Proteolysis, expressed as  $\mu$ moles free glycine per g cheese, increased from 40 to 150 (trichloroacetic acid soluble) and from 25 to 130 (phosphotungstic acid soluble) during the ripening period. Histamine levels, however, remained low in the inoculated cheeses ( $< 5$  mg/100 g), suggesting that the potential for histamine formation may be minimal in low-salt Cheddar cheese. It was concluded that the relatively low levels of proteolysis and low temp. of storage were primarily responsible for inhibiting histamine production. AA

## Mozzarella cheese

831

Farkye (NY), Kiely (LJ), Allshouse (RD) and Kindstedt (PS). **Proteolysis in Mozzarella cheese during refrigerated storage.** *Journal of Dairy Science* 74(5): 1991: 1433-1438

On four occasions, a 2.72-kg (6-lb) rectangular block of commercial Mozzarella cheese was obtained immediately after manufacture and brined (27% NaCl wt/wt, pH 5.3) in the lab. for 4 h at 4°C. After brining, 4 concentric sections (1 = 0 to 1 cm from surface, 2 = 1 to 2 cm, 3 = 2 to 3 cm, and 4 = core) were taken from half the block and analyzed for NaCl, moisture, and proteolysis. The other half was vacuum packaged and aged at 4°C for 14 days prior to sectioning and analysis. Average NaCl concn. in fresh cheese (1 day after manufacture) were highest (2.28 plus or minus 0.28%) in section 1 and decreased sharply to < 0.3% in sections 2, 3 and 4 but became linear after 14 days of aging. Moisture concn. in the fresh cheese (1 day) were lowest in the core (49.06 plus or minus 1.77%) and outermost sections (49.41 plus or minus 2.56%), highest in section 2 (52.22 plus or minus 2.86%), and intermediate in section 3 (50.43 plus or minus 1.95%). However, after 14 days, cheeses did not have a similar pattern of moisture distribution, and no significant differences were found among sections within cheeses. Electrophoretograms of the cheeses showed a breakdown of  $\alpha_{s1}$ -casein to  $\alpha_{s1}$ -I-peptide, suggesting residual coagulant activity. Also the intensity of the band corresponding to  $\beta$ -casein decreased with concomitant increase in  $\gamma$ -casein bands, suggesting plasmin activity. Other unidentified bands with electrophoretic mobility slower than  $\gamma$ -caseins were noted. Between day 1 and 14 postmanufacture,  $\alpha_{s1}$ -casein and  $\beta$ -casein decreased by 26.4 plus or minus 10.1% and 40.2 plus or minus 9.0%. Levels of total N soluble in water increased from 4.07 plus or minus 1.10% in fresh cheese to 9.66 plus or minus 1.61% in 14 day old cheese. AA

## Desserts

832

Donhowe (DP), Hartel (RW) and Bradley (RLJr). **Determination of ice crystal size distributions in frozen desserts.** *Journal of Dairy Science* 74(10): 1991; 3334-3344

Formation of the ice crystal size distribution during manufacture of frozen desserts play an important role in determining textural characteristics. A crystal size distribution with a large mean size and wide variation results in a coarse product. A new methodology has been developed to characterize the ice crystal size distribution accurately. An optical microscope was used to produce photomicrographs of ice crystals in frozen products. The microscope was housed in a refrigerated glove box, which provided excellent temp. control and allowed samples to be analyzed at various stages of manufacture. The photomicrographs were analysed using a digitizing board connected to a microcomputer. Several ice cream and ice milk

formulations were analyzed to test the methodology. Ice crystal size was inversely related to the total solids of the formulations. Ice crystal size also increased substantially between draw and hardening and during the first 7 wk of storage at -20°C. Further frozen storage did not result in any significant change in crystal size. These results agree with previous data and with theoretical considerations. AA

## Ghee

833

Banerjee (D), Patil (MN) and Jaiswal (PK). **Detection of palmolein in ghee.** *Journal of the Oil Technologists Association of India* 24(2): 1992: 53-54

A simple TLC method, involving extraction of unsaponifiable matter, its concn. under vacuum, separation of compounds using argentated silica gel-G plates and its visualization with a spraying agent, is claimed to detect palmolein upto 7.5% in ghee. SD

834

Rama Prasad (C) and Subramanian (R). **Qualitative and comparative studies of cholesterol oxides in commercial and home-made Indian ghees.** *Food Chemistry* 45(1): 1992: 71-73

Cholestane triol and epoxide were identified in home-made ghee but not in commercial samples. Butter subjected to high temp. resulted in cholesterol converted into high content of cholesterol oxides (CO) in ghee. These CO from home-made ghee might lead to adverse effects and atherosclerosis. SD

835

Yadav (JS) and Srinivasan (RA). **Advances in ghee flavour research.** *Indian Journal of Dairy Science* 45(7): 1992: 338-348

The chemical and biotechnological aspects of ghee flavour are reviewed. The role of starter microorganisms in imparting *desi ghee* like flavour to cream-based ghee due to production of certain flavour constituents are discussed. Attempts at simulation of ghee flavour into butter-oil using microorganisms and formulation of synthetic mixture of ghee flavour are also described. 77 references. SRA



## Gulab jamun

836

Patel (AA), Patil (GR), Garg (FC) and Rajorhia (GS). **Textural characteristics of market samples of gulab jamun.** *Indian Journal of Dairy Science* 45(7): 1992: 356-359

The market samples of gulab jamun (a popular milk-based sweet) varied in overall texture quality (TQ) and exhibited variation in texture profile (TP) and sensory texture descriptors. Sponginess and juiciness was observed in moderate intensity showing a high TQ, and were found to be the desirable attributes. Crumbliness and gumminess were considered less desirable. Sponginess contributed 76% of the TQ of gulab jamun. Instron hardness and deformation energy were highly correlated with sensory firmness. Notable correlations were observed between instrumental fracturability and sensory crumbliness and chewiness. SRA

## Yoghurts

837

Gassem (MA) and Frank (JF). **Physical properties of yoghurt made from milk treated with proteolytic enzymes.** *Journal of Dairy Science* 74(5): 1991: 1503-1511

Milk was treated with either crude extracts of bacterial protease or purified plasmin. Treated milk was immediately made into yoghurt, which was stored at 7°C and analyzed after 1, 8, and 15 days. Yoghurt made from milk pretreated with microbial protease had higher firmness, syneresis, and apparent viscosity than the untreated product. Yoghurt made from milk treated with plasmin had significantly lower firmness and apparent viscosity, and after 8 days, lower syneresis as compared with the control. Yoghurt made from milk treated with either protease had lower water-holding capacity and protein hydration than untreated controls. Proteolysis of milk did not produce consistent effects on yoghurt culture levels, although fermentation was more rapid in the treated milks. Results indicate that proteolysis of milk results in yoghurt of substantially different physical properties and that the effects of proteases from psychrotrophic bacteria on the properties of yoghurt differ from the effects of plasmin. AA

838

Fellows (JW), Chang (SW) and Keller (SE). **Effect of sundae-style yoghurt fermentation on the aspartame stability in fruit preparation.** *Journal of Dairy Science* 74(10): 1991: 3345-3347

The stability of aspartame during fermentation of milk to manufacture yoghurt with fruit on the bottom (sundae-style yoghurt) using different direct-set cultures and incubation temp. was assessed. Aspartame recovery based on original amount was determined using HPLC. Aspartame recovery was 95 or 90% in yoghurts produced using a 6 h incubation at 43.3°C and 13 h at 32.2°C, respectively. Aspartame, therefore, has excellent stability in fruit preparation during the manufacture of sundae-style yoghurt. AA

## Milk proteins

839

Traore (F) and Meunier (J-C). **Cross-linking activity of placental F XIII<sub>a</sub> whey proteins and caseins.** *Journal of Agricultural and Food Chemistry* 40(3): 1992: 399-402

Human placental factor XIII (F XIII), purified from a commercial source and activated by Ca, was used to enzymatically cross-link individual whey proteins ( $\alpha$ -lactalbumin,  $\beta$ -lactoglobulin, bovine serum albumin) and a mixture of total caseins and bovine serum albumin. Polymerization of DTT-reduced  $\alpha$ -lactalbumin and  $\beta$ -lactoglobulin was incomplete. Saturation of the response was reached in the time range 2 - 3 h and the substrate concn. range 10 - 20 mg/mL. A heat treatment had no effect on the polymerization of  $\alpha$ -lactalbumin by F XIII<sub>a</sub>, whereas  $\beta$ -lactoglobulin gelled. A nonenzymatic gelation of both reduced proteins was observed above 50 mg/mL in the presence of Ca. Analysis of reaction products between BSA and caseins indicated that both proteins were polymerized, in the absence of DTT, through the formation of intermolecular cross-links. In contrast, polymerization of BSA required this reductant. AA

## MEAT AND POULTRY

### Meat

840

Robe (GH) and Xiong (YL). **Phosphates and muscle fiber type influence thermal transitions in porcine salt-soluble protein aggregation.** *Journal of Food Science* 57(6): 1992: 1304-1307, 1310

Salt-soluble proteins (SSP) were extracted from porcine Serratus ventralis (red), Vastus intermedius (red) and Longissimus dorsi (white) muscles and heated to examine dynamic changes and transitions in protein aggregation. At pH 6.0, red muscle SSP typically showed 1 or 2 transitions and white muscle

SSP exhibited 3 transitions. Addition of ortho-, pyro-, tripoly- and hexametaphosphate up to 1% increased SSP transition temp. and altered transition patterns; NaCl at comparable ionic strengths did not show this effect. SSP transitions were most affected by 0.15 - 0.25% tripolyphosphate and low pH (< 6.0). Red and white SSP exhibited different thermal properties and responses to phosphate treatments. These findings indicate red and white muscle types should undergo different processing treatments for optimum quality meat products. AA

841

Alvarado (R), Rodriguez-Yunta (MA), Hoz (L), Fernando (GD) and Ordóñez (JA). **Rapid p-nitroaniline test for assessing microbial quality of refrigerated meat.** *Journal of Food Science* 57(6): 1992; 1330-1331

The p-nitroaniline test, a rapid and inexpensive method to estimate microbial quality of refrigerated meat, allows detn. of psychotroph levels between  $10^4$  and  $10^8$  cfu/cm<sup>2</sup> in 2.5 h. The method correlates ( $r = 0.88$ ,  $p < 0.001$ ) well with the standard plate count technique. Bacterial loads higher than  $10^5$  cfu/cm<sup>2</sup> develop a colour intense enough to be detected visually. GS

842

Skytta (E), Hereijers (W) and Mattila-Sandholm (T). **Broad spectrum antibacterial activity of *Pedococcus damnosus* and *Pedococcus pentosaceus* in minced meat.** *Food Microbiology* 8(3): 1991; 231-237

Three *Pedococcus* strains producing bacteriocin-like inhibitors were tested for their antibacterial effects. The study was carried out in minced meat inoculated with 4 test organisms, *Yersinia enterocolitica*, *Listeria monocytogenes* or *Pseudomonas fragi* and *Pseudomonas fluorescens*. The inoculation levels of pediococci varied within a range of  $10^3$  -  $10^8$  cfu g<sup>-1</sup>, whereas the number of test organisms inoculated was approx. constant at  $10^2$  cfu g<sup>-1</sup>. In order to enhance the bacteriocin production of pediococci, the inoculated samples were first kept at 15°C for 2 days, thereafter they were stored at 6°C. The growth of test organisms was followed at 2 or 3-day intervals for 2 wks. The results showed that all strains of pediococci inhibited the growth of test organisms at the highest inoculation level, lower levels did not have any effect on the growth of test organisms. In parallel, the experiments were carried out by replacing the viable *Pedococcus* cells by a cell-free crude extract of inhibitors isolated from the growth medium of pediococci. The extracts showed a strong inhibition potential against all test organisms. The pH values

of the samples did not significantly decrease during the storage period. The results showed evidence that selected strains of pediococci have a broad spectrum antibacterial potential in a food matrix due to inhibition of Gram-negative organisms. AA

843

Al-Dagal (M), Mo (O), Daniel (YC), Fung (YC) and Kastner (C). **A case study of the influence of microbial quality of air on product shelf-life in a meat processing plant.** *Dairy, Food and Environmental Sanitation* 12(2): 1992; 69-70

The airborne microbes in the meat processing plant were monitored twice a month for 3 months with concern of shelf-life of cooked products (Weiners). The aerobic plate counts in the first 2 wks were 100 to 300 CFU/m<sup>3</sup> in all processing areas, except the hallway and the showering areas (where the number exceed 300 CFU/m<sup>3</sup>). Subsequent samples generally gave higher counts. Suggested changes included eliminating stacked boxes in the hallway where the product was showered, decreasing the cross traffic among workers, and more frequent cleaning. Other suggested changes in processing practices, after further evaluation of the microbial quality of air, included showering of the product inside the smoke house and reducing the time from cooking until packaging. SRA

## Beef

844

Egbert (WR), Huffman (DL), Chen (CM) and Jones (WR). **Microbial and oxidative changes in low-fat ground beef during simulated retail distribution.** *Journal of Food Science* 57(6): 1992; 1269-1274, 1293

Low-fat ground beef product containing water, carrageenan, encapsulated salt and hydrolyzed vegetable protein (carrageenan based) was compared to a low-fat, all beef control during simulated commercial manufacturing and retail distribution. Few differences were found ( $P > 0.05$ ) in aerobic plate counts, populations of psychrotrophs or mold and yeast populations for the 2 products. Differences were little in oxidative stability and microbial growth. Hunter colour 'a' values (redness) and overall colour scores for surface colour were higher ( $P < 0.05$ ) for carrageenan-based product than all the other products. Retail display of the low-fat products in oxygen-permeable (aerobic) packaging resulted in greater product discoloration than that of products in oxygen-impermeable packaging. BV



Maruri (JL) and Larick (DK). **Volatile concentration and flavour of beef as influenced by diet.** *Journal of Food Science* 57(6); 1992: 1275-1281

Yearling steers were fed with 3 types of diet (i) Tifleaf pearl millet; (ii) millet with restricted grain; or (iii) millet followed by grain ad libitum. In 20% fat ground beef and subcutaneous fat, gamey/stale off-flavour decreased and roasted beef flavour increased when steers were fed with grain. Compounds (59) including acids, alcohols, aldehydes, diterpenoids, hydrocarbons, and lactones were identified in the purge-and-trap volatiles. Diterpenoids positively correlated with gamey/stale off-flavour and negatively correlated with roasted beef flavour. Lactones positively correlated with roasted beef flavour and negatively correlated with gamey/stale off-flavour. BV

846

Unklesbay (N), Unklesay (K), Hsieh (F) and Sandik (K). **Thermophysical properties of extruded beef/corn flour blends.** *Journal of Food Science* 57(6); 1992: 1282-1284

Three beef/corn meal blends extruded at 91 and 109°C was analysed for thermophysical properties ((TPP), thermal properties, specific heat (SH) thermal conductivity (TC) and density). Density values ranged from 1.054 to 1.091 kg/m<sup>3</sup>; specific heat was 2.944 to 3.055 kJ/kgK; and thermal conductivity 0.26 to 0.39 W/mK. Thermal diffusivity values ranged from 0.831 to 1.200 (x 10<sup>-7</sup> m<sup>2</sup>/sec). Inclusion of white or yellow corn flour (CF) and soy fiber, several differences among the TPP were observed. A high end point product temp. (109°C) after extrusion resulted in less moisture in the product, compared to those products extruded at lower temp. (91°C). No significant effect on thermal conductivity values were observed except for formulations with yellow CF. This indicates that formulations with white CF need greater precision in TC measurements for using as a quality control criterion in extrusion. SH values of extruded products showed no significant differences with regard to formulation or extrusion conditions. BV

847

Camero (MI), Seuss (I) and Honikel (KO). **Flavour compounds of beef broth as affected by cooking temperature.** *Journal of Food Science* 57(6); 1992: 1285-1290

Beef broth obtained on heating at 85°C for 60 min had the most intense brothy flavour. A significant correlation between cooking temp. of the broth and the concn. of certain compounds such as free amino acids (FAA) ( $r = 0.88$ ,  $P < 0.005$ ), carnosine ( $r = 0.83$ ,

$P < 0.005$ ) and inosine 5'-monophosphate (IMP) ( $r = 0.94$ ,  $P < 0.005$ ) was detected. Sensory evaluation indicated that a wide mixture of FAA, peptides of low mol. wt. (less than or equal to 300 daltons) and IMP played an important role in the flavour intensity of beef broth. GS

848

Jones (SDM), Jeremiah (LE), Tong (AKW), Lutz (S) and Robertson (WM). **The effects of marbling level, electrical stimulation and post-mortem aging on the cooking and palatability properties of beef rib-eye steaks.** *Canadian Journal of Animal Science* 71(4); 1991: 1037-1043

849

El-Shimi (NM). **Influence of microwave and conventional cooking and reheating on sensory and chemical characteristics of roast beef.** *Food Chemistry* 45(1); 1992: 11-14

Microwave-treated samples showed more flavour, less juicy and tender than the conventionally treated samples but in chemical composition there was no difference. SD

850

Lewis (GJ), Purslow (PP) and Rice (AE). **The effect of conditioning on the strength of perimysial connective tissue dissected from cooked meat.** *Meat Science* 30(1); 1991: 1-12

851

Prasai (RK), Acuff (GR), Lucia (LM), Hale (DS), Savell (JW), Morgan (JB). **Microbiological effects of acid decontamination of beef carcasses at various locations in processing.** *Journal of Food Protection* 54(11); 1991: 868-872

Hot (55°C), dilute (1% v/v) lactic acid was sprayed on beef carcass surfaces immediately after dehiding, after evisceration (immediately before chilling), or at both locations. Surface samples of carcasses were examined for total aerobic plate counts (APCs) and for the presence of *Salmonella* and *Listeria*. APCs of treated beef carcasses were lower ( $P < 0.05$ ) than those of control carcasses. APCs were determined both at slaughter day 0 (immediately after carcasses enter the chill room) and after 72 h postmortem. At day 0, reduction in log<sub>10</sub> APC by more than 90% occurred when carcasses were treated with lactic acid after evisceration or both after dehiding and after evisceration. The effect of lactic acid decontamination was greatest on carcasses treated with lactic acid both after dehiding and after evisceration. No further reductions in APCs of carcasses were observed on samples taken 72 h postmortem. No difference in colour between



control and acid-treated carcasses was observed. All samples tested for the presence of *Salmonella* were negative. *Listeria* was detected in 3 samples from control carcasses only. Samples obtained from strip loins of acid-treated or control carcasses did not show any consistent pattern of differences in microbiological counts. Additional data collected from carcasses sprayed with lactic acid in 3 different sized slaughter plants showed that irrespective of differences in size of slaughter facility, mean APCs of acid-treated carcasses were significantly ( $P < 0.05$ ) lower than those of control carcasses. AA

## Mutton

## Lambs

852

Farouk (MM), Price (JF) and Salih (AM). **Post-exsanguination infusion of ovine carcasses: Effect on tenderness indicators and muscle microstructure.** *Journal of Food Science* 57(6): 1992: 1311-1315

Lambs were assigned to 3 treatment groups: control (Ctr), infused with 10% volume (by wt.) of a tenderizing blend (NCa), and NCa plus 0.015M  $\text{CaCl}_2$  (WCa). Compared to Ctr and WCa, NCa-treated samples had lower shear force values ( $P < 0.05$ ) and higher percent change in myofibrillar fragmentation index ( $P < 0.05$ ). SDS-PAGE of infused samples revealed the appearance at 24 h postmortem of 22 - 30 kd protein components. Scanning electron micrographs of NCa myofibrils showed they were more fragmented, fractured, or split and had wider interfibrillar spaces compared to Ctr and WCa. The fracture plane of muscles immediately postmortem was along the endomysial-sarcolemmal sheath, while at 24 h postmortem the sheath was weakened enough for the fracture to occur along the surface of the myofibrils. AA

## Pork

853

Lambert (AD), Smith (JP) and Dodds (KL). **Physical, chemical and sensory changes in irradiated fresh pork packaged in modified atmosphere.** *Journal of Food Science* 57(6): 1992: 1294-1299

A substantial extension in sensory shelf-life and < 2 to 2 days at 25°C (9 to 26 days at 5°C) of fresh pork was achieved using modified atm. packaging in conjunction with low-dose irradiation (1 KGy) and in the absence of  $\text{O}_2$ . For max. extension of shelf-life, product should be irradiated under anaerobic conditions since irradiation in presence of  $\text{O}_2$

adversely affected physical, chemical and sensory characteristics of the product. BV

854

Larson (EM), Holm (ET), Marchello (MJ) and Slinger (WD). **Physical and sensory characteristics of fresh pork leg roasts cooked at low temperatures.** *Journal of Food Science* 57(6): 1992: 1300-1303, 1315

Fresh pork leg roasts cooked at low temp. (82 and 93°C) yielded a juicer, more tender and flavourful product and with less warmed-over-flavour after refrigeration and reheating than roasts cooked at 121 and 163°C. Aerobic mesophilic bacteria were fewer in roasts cooked at 93°C. Cooking pork at low temp. for extended periods of time decreased total cooking losses, increased meat yields and minimized cost/serving. GS

855

Martin (R), Wardale (RJ), Jones (SH), Hernandez (PE) and Patterson (RLS). **Monoclonal antibody sandwich ELISA for the potential detection of chicken meat in mixtures of raw beef and pork.** *Meat Science* 30(1): 1991: 23-31

856

Unklesbay (K), Unklesbay (N) and Biedrzycki (K). **Convection heat transfer coefficient for a restructured pork/soy hull product.** *Journal of Food Process Engineering* 14(3): 1991: 197-208

Heat transfer coeff.,  $h$ , ( $\text{J}/\text{cm}^2\text{min}$ ) were determined for a pork/soy hull mixture during heating in a convection oven (142°C) with and without control of the dew point. Data were acquired by heat processing 5 stacked layers of product (10 x 10 x 1 cm) so that heat was only conducted into the top surface. One experiment was designed to determine  $h$  when the second layer from the top reached one of 6 temp.: 20, 32, 44, 56, 68 and 77°C, with no control of the dew point. The second experiment determined  $h$  for 60 min of heating for 5 dew point levels: 6, 21, 31, 40 and 50°C. Without the control of humidity, values for  $h$  ranged from 0.0170 - 0.0366  $\text{J}/\text{cm}^2\text{min}$ . The heat transfer coeff. increased with temp. and heat processing time. Product yield and surface area ratios decreased as  $h$  increased. When RH was controlled, values for  $h$  ranged from 0.0167 - 0.0270  $\text{J}/\text{cm}^2\text{min}$ , decreasing for dew points above 31°C. AA



## Products

857

Hattula (MT) and Wallin (HC). **Enzymatic determination of free glutamic acid in dried soups and in minced sausages: NMKL collaborative study.** *Journal of the Association of Official Analytical Chemists* 74(6): 1991: 921-925

858

Kato (T), Simizu (K), Harata (A) and Sato (Y). **Effects of smoking on staphylococcal growth and enterotoxin production in fermented sausage.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 38(4): 1991: 344-349

Changes in the viable counts and enterotoxin production of *Staphylococcus aureus* during fermentation of sausages were investigated. By smoking at 37°C for 6 h, staphylococcal growth and enterotoxin production on the surface of sausages were inhibited, even if lactic starter was not added. On the other hand lactic starter could inhibit *S. aureus* growth in the center of unsmoked sausages. By the combination of lactic starter and smoking at the beginning of fermentation stage, the staphylococcal growth and enterotoxin production were effectively inhibited at both surface and center of sausages, while smoking practically exerted no effect on lactic fermentation of sausages. AA

859

Conventry (J) and Hickey (MW). **Growth characteristics of meat starter cultures.** *Meat Science* 30(1): 1991: 41-48

The Australian Code of Practice for manufacture of dry and semi-dry sausage (salami) states that fermentation temp. must not exceed 25°C and that a pH of 5.2 must be achieved in the product within 48 h. In order to select the most appropriate starter cultures for fermentation, *Lactobacillus plantarum*, *Pedilococcus pentosaceus* and *Staphylococcus carnosus* were characterised with respect to growth and acid production determined at constant pH (4.7, 5.5 and 6.3). *L. plantarum* and *P. pentosaceus* showed similar characteristics over the pH range studied while *S. carnosus* was sensitive to lower pH. Also, *P. pentosaceus* showed greater psychrotrophic growth without pH control than *L. plantarum* or *S. carnosus*. Salami made with *P. pentosaceus* maintained higher viable numbers in the product over 8 days than did *L. plantarum*. Growth of *S. carnosus* in salami could not be detected in the presence of the more pH-tolerant organisms. The growth of *L. plantarum* and *P. pentosaceus* did not prevent the development of high levels of non-starter flora, a factor that can be important in determining

salami quality. However, the more psychrotrophic *P. pentosaceus* ensured a greater dominance of starter over non-starter flora. AA

860

Okayama (T), Fujii (M) and Yamanoue (M). **Effect of cooking temperature on the percentage colour formation, nitrite decomposition and sarcoplasmic protein denaturation in processed meat products.** *Meat Science* 30(1): 1991: 49-57

The effect of cooking temp. and time on the percentage colour formation, nitrite decomposition and denaturation of sarcoplasmic proteins in processed meat products was investigated in detail. The colour forming percentage increased with a rise in temp. of heating, especially at 50 - 60°C (P < 0.05). The percentage nitrite decomposition was promoted by the retention time of cooking rather than by cooking temp. (P < 0.05). The percentage of sarcoplasmic proteins denatured was enhanced by heating temp. in the range 50 - 80°C (especially at 50 - 60°C) (P < 0.05). The relationship between the percentage colour formation and the percentage of sarcoplasmic proteins denatured is discussed. The SDS-PAGE patterns of the heat-treated samples revealed the components of the sarcoplasmic proteins which had been denatured. AA

## Ham

861

Molina (I) and Toldra (F). **Detection of proteolytic activity in microorganisms isolated from dry-cured ham.** *Journal of Food Science* 57(6): 1992: 1308-1310

Proteolytic activities of *Pedilococcus pentosaceus* and *Staphylococcus xylosus*, isolated from Spanish serrano dry-cured ham, were studied. *Ped. pentosaceus* showed a stronger leucine and valine arylamidase activities and *Staph. xylosus* showed a very weak leucine arylamidase activity. BV

## Poultry

862

Ravinder Reddy (S). **Pesticides contamination of feed and its effect on poultry.** *Poultry Guide* 30(1): 1993: 27-29

Reports the pesticide residues in poultry diet and their toxic effects on the egg shell thickness and reproductive activity of poultry. Safe and judicious use of pesticides is recommended. GS

## Chickens

863

Pandey (NK), Dev Roy (AK) and Ram Gopal. **Carcass characteristics, meat yield and quality of synthetic dam line broiler chicken.** *Indian Journal of Poultry Science* 27(2): 1992: 95-99

Carcass traits, cooking yield and meat quality of 2 types of broiler chicken (i) synthetic dam line (SDL) and unselected control line (IC<sub>3</sub> control) were compared. Genetic group or sex had no significant effect on the water holding capacity, pH, moisture, total protein and fat contents of breast and leg meats. However, SDL broilers contained less moisture and more fat in breast and leg meats than the control line. Total protein content remained the same in both the groups. SDL broilers had higher live and dressed carcass wt., total edible and giblet yields and deboned meat with higher breast and lower wings wt. than the control. Cooking and meat yield of male carcass cuts were superior to females. But the ratios of meat to bone and breast to leg meat were not influenced by genetic group or sex. GS

864

Young (LL), Papa (CM), Lyon (CE) and Wilson (RL). **Moisture retention and textural properties of ground chicken meat as affected by sodium tripolyphosphate, ionic strength and pH.** *Journal of Food Science* 57(6): 1992: 1291-1293

Batches of ground chicken meat were mixed with 10% sol. containing 0.0 - 5.0% sodium tripolyphosphate and sufficient NaCl to adjust the ionic strength (IS) of the sol. from < 0.7 to 6.0 at pH 6.5 to 9.5 in a 6 x 4 x 7 factorial experimental design. Patties prepared from the mixtures were evaluated for pH, cooking loss, and objective texture characteristics. Most effects of STPP were attributable to the direct effect of STPP on IS. However the ability of the phosphate to alter textural properties was greater at a pH value near the pK<sub>a</sub> of the phosphate. AA

865

Alvarez (VB), Smith (DM) and Flegler (S). **Effect of extruder die temperature on texture and microstructure of restructured mechanically deboned chicken and corn starch.** *Food Structure* 10(2): 1991: 153-160

Chicken/15% corn starch extruders restructured at die temp. of 25, 71, 82, 93, 104 and 115°C were evaluated by SEM and for proximate composition. Total solids and fat decreased and protein increased as the temp. increased. Extruders restructured at die temp. 71 and 82°C exhibited microstructures similar to salt soluble muscle protein gels and

extruders prepared at above 93°C similar to gelatinized starch. SD

866

Marshall (DL), Wiese-Lehigh (PL), Wells (JH) and Farr (AJ). **Comparative growth of *Listeria monocytogenes* and *Pseudomonas fluorescens* on precooked chicken nuggets stored under modified atmospheres.** *Journal of Food Protection* 54(11): 1991: 841-843, 851

The purpose of this study was to determine the effects of modified atm. packaging (MAP) on growth of *L. monocytogenes* and *P. fluorescens* on precooked darkmeat chicken nuggets during refrigerated storage. The 2 organisms were separately inoculated on nuggets and stored under modified atm. (MA<sub>1</sub> or MA<sub>2</sub>) at 3, 7 or 11°C. The results show that the growth of *P. fluorescens* was inhibited by MAP to a greater extent than was the growth of *L. monocytogenes*. Even though growth of *L. monocytogenes* was inhibited by MAP, the organism was still capable of growth at all 3 temp. The effectiveness of MAP decreased with increasing temp. Little difference in inhibition of growth was observed for either organism with MA<sub>1</sub> or MA<sub>2</sub>. AA

## Broilers

867

Ajuyah (AO), Lee (KH), Hardin (RT) and Sim (JS). **Influence of dietary full-fat seeds and oils on total lipid, cholesterol and fatty acid composition of broiler meats.** *Canadian Journal of Animal Science* 71(4): 1991: 1011-1019

The incorporation of full-fat flax seeds or flax oil plus flax meal into broiler diets resulted in elevated deposition levels of  $\omega$ -3 fatty acids ( $\alpha$ -linolenic acid, 18:3 $\omega$ 3 and eicosapentaenoic acid, 20:5 $\omega$ 3 in white and dark broiler meat. GS

## Ducks

868

Ndi (EE) and Brekke (CJ). **Thermal aggregation properties of duck salt-soluble proteins at selected pH values.** *Journal of Food Science* 57(6): 1992: 1316-1320

Thermal aggregation properties of duck breast and leg salt-soluble proteins (SSP) were studied at pH 5.50, 5.75 and 6.00. At pH 5.50, a major transition for breast was observed at 60.3°C and for leg at 41.8°C. At pH 5.75, major transitions at 44.6 and 43.2°C were obtained, respectively, for the breast and leg SSP. Three transitions at 46.0, 53.0°C and 59.0°C were exhibited by breast SSP at pH 6.00.



whereas only 2 major transitions at 47.4 and 54.0°C were identified in leg SSP. Changes in transition peak heights and shifts in transition temp. as a result of pH changes indicated that, depending on fiber type, pH may enhance or suppress the aggregation behaviour of specific constituents of the myosin/actomyosin complex, thereby altering the overall aggregation pattern of the protein preparation. AA

## Products

### Eggs

869

Korane (UN), Sarag (AN), Sadekar (RD), Sirothia (AR) and Dharmadhikari (DN). **Effect of replacement of maize with prosomillet on egg yolk pigmentation and egg quality traits.** *Indian Journal of Poultry Science* 27(3); 1992: 144-147

Replacement of maize with prosomillet (*Panicum miliaceum*) at 50% and 100% levels was tried in the layer's ration and its effects on egg yolk pigmentation and other egg quality traits were studied. It was observed that replacement of maize produced paler egg yolk, though it did not affect any of the internal and external qualities of the eggs. The paleness of egg yolk in replacement diet was attributable to the lower  $\beta$ -carotene content in prosomillet (4.21 mg/kg) than in maize (8.99 mg/kg). AA

870

Singh (RP) and Jitendra Kumar. **Evaluation of selection procedures to improve annual egg production and egg weight in chickens.** *Indian Journal of Poultry Science* 27(2); 1992: 71-77

Pullets and cockerels were selected at the proportion of 16.6 and 6.25% respectively for propagation. Egg production upto 280 days of age, egg wt. (EW) during 38 - 40 wk of age and annual egg production (AEP) of selected pullets in the next generation were analysed. It was found that the selection of pullets in single stage did not improve egg production and EW simultaneously. Two stage selection i.e. initial selection on egg wt. (50%) and on an index of part egg production and dams's annual egg production resulted in simultaneous improvement of 2.13 eggs in AEP and 0.1 g in EW. Three stage selection is expected to be superior to two stage selection. GS

871

Saito (M), Oh-Hashi (A) and Yamaguchi (M). **Liver microsomal mixed-function oxidases in response to dietary whole egg protein levels in rats.** *Journal of Nutritional Science and Vitaminology* 38(2); 1992: 163-176

Relation between the activity of liver microsomal mixed-function oxidase system and dietary protein level was investigated in rats using purified whole egg protein, i.e. free from limiting amino acids. The animals were given either a diet containing 0, 5, 10, 20 or 40% of protein (experiment 1) or a diet containing 5, 10, 15 or 20% of protein (experiment 2) for 16 days. In experiment 2, half of the rats of each group were intraperitoneally injected sodium phenobarbital (PB) to induce the mixed-function oxidase system. The cytochrome P-450 content plateaued even at 5% level of dietary protein in experiment 1 and in the PB-untreated groups of experiment 2. However, it showed the highest value at 15% protein level in the PB-treated groups of experiment 2, indicating a shift of the response peak to a higher protein level due to an increase in protein requirement. Cytochrome P-450 reflected most specifically the dietary protein levels when the enzyme system was induced by PB. The 15% protein levels, equivalent to 14.1 protein calories %, is a little higher than the optimal dietary level of whole egg protein ever obtained by usual nutritional indices. AA

872

Williams (KC). **Some factors affecting albumen quality with particular reference to Haugh unit score.** *World's Poultry Science Journal* 48(1); 1992: 5-16

The maintenance of albumen quality during egg storage is dependent on the eggs being cooled quickly and held subsequently at low temp. (0°C). Oiling of eggs within 24 h of lay is effective in retarding albumen deterioration but does not replace the need for cool storage. Review. 52 references. GS

873

Katusin-Razem (B), Mihaljevic (B) and Razem (D). **Radiation-induced oxidative chemical changes in dehydrated egg products.** *Journal of Agricultural and Food Chemistry* 40(4); 1992: 662-668

Radiation-induced buildup of lipid hydroperoxides (LOOH) and destruction of carotenoids were followed in whole egg powder and egg yolk powder as functions of dose, dose rate, and the presence of oxygen. In the absence of air the formation of LOOH was limited by the available oxygen, while destruction of carotenoid progressed linearly with dose; neither process depended on the dose rate. In the presence of air, the accumulation of LOOH and the destruction of carotenoids were strongly coupled and inversely proportional to the dose rate. The induction dose of 2.5 kGy was observed in air in both whole egg powder and egg yolk powder, independent



of the dose rate. The practical consequence is that radiation decontamination can be carried out in the presence of air at the highest available dose rate by a dose not exceeding 2.5 kGy to avoid extensive degradation. This dose is adequate for a  $10^3$  reduction factor of *Salmonella* and well within the threshold dose of 3 kGy for organoleptic changes. AA

### Egg white

874

Cotterill (OJ), Chang (CC), McBee (LE) and Heymann (H). **Metallic cations affect functional performance of spray-dried heat-treated egg white.** *Journal of Food Science* 57(6): 1992: 1321-1342, 1347

The functional performance of 4 metallic cations ( $\text{Cu}^{++}$ ,  $\text{Al}^{+++}$ ,  $\text{Fe}^{+++}$ ,  $\text{Zn}^{++}$ ) in spray-dried, heat-treated egg white were evaluated.  $\text{Cu}^{++}$  excelled in all functional categories involving foams and angel food cakes.  $\text{Zn}^{++}$  was least effective. These data suggest that  $\text{Cu}^{++}$  would be a suitable additive to spray-dried egg white systems. AA

### Egg yolk

875

Causeret (D), Matringe (E) and Lorient (D). **Mineral cations affect microstructure of egg yolk granules.** *Journal of Food Science* 57(6): 1992: 1323-1326

The physico-chemical characteristics of the egg yolk medium such as pH, ionic strength and bivalent cations affected the microstructure of the granules in egg yolk. The phospho calcic bridges were the major causes of protein association in granules, containing 80% of the Ca. Addition of a Ca-chelating agent, EDTA caused a complete destruction of granules. On the other hand addition of bivalent or trivalent cations at low concn. strengthened the structure which resisted changes in pH or ionic strength. GS

## SEAFOODS

876

Anandavally (N). **"HACCP" concept in quality assurance in seafood industries.** *Seafood Export Journal* 24(6): 1992: 5-9

HACCP is the best system for improving the microbiological safety of foods. Anticipation of hazards, identification of critical control points

(CCP), description, monitoring of CCPs, corrective actions to be taken when operation is out of control; and verifications of the working of HACCP are detailed. The utilization of HACCP concept and the quality control for seafood group (i) fresh and frozen fish and crustaceans; (ii) heat treated fish; (iii) dried and dry-salted fish and (iv) molluscs including fresh and frozen mussels, clams, oysters in shell or shucked are discussed. GS

877

Mishra (R) and Dora (KC). **Seafood processing industry in Orissa - potential for its development.** *Seafood Export Journal* 24(8): 1992: 7-9

Reports the importance of increasing the fish production, making it available in good condition to consumers at reasonable cost; methods of preservation like sundrying, salt curing, freezing and canning; and by-products utilization. Data regarding fish production, utilization, disposition and the byproduct utilisation of Orissa fish industry are also given. GS

### Clams

878

Gourama (H), Tsai (WYJ) and Bullerman (LB). **Growth and production of enterotoxins A and D by *Staphylococcus aureus* in salad bar ingredients and clam chowder.** *Journal of Food Protection* 54(11): 1991: 844-847

Growth and production of enterotoxins A and D (SEA, SED) by two strains of *Staph. aureus* were determined in salad bar ingredients and clam chowder. Salad bar ingredients included lettuce, canned black olives, canned green olives, tomato, green pepper, blue cheese salad dressing, blue cheese crumbles, celery, and croutons. Total *Staph. aureus* were determined by plate count on Baird-Parker agar. Enterotoxins were quantified by using an ELISA technique. *Staph. aureus* did not survive in salad dressing, with pH 4.3. With the exception of olives and blue cheese, *Staph. aureus* survived on all ingredients for more than 12 h. After 24 h, the total number of cells decreased on most of the ingredients. *Staph. aureus* grew well on green pepper during the first 24 h, reaching  $10^5$  cfu/g, but no enterotoxins were detected. *Staph. aureus* also increased in moist and dry plain croutons, but there was no detectable production of enterotoxins. *Staph. aureus* growth was excellent in clam chowder with cell counts exceeding  $10^8$  CFU/g after 12 h at 42°C. Production of SEA and SED began shortly after 3 h. Maximal levels of SEA and SED were 0.29 and 1.6 ng/g, respectively, after 12 h. In brain heart infusion broth, the production of SEA and SED



reached 21.9 and 36.3 ng/ml, respectively, after 24 h at 37°C. AA

## Scallops

879

Chung (SL) and Merritt (JH). **Kinetic study of quality losses in frozen scallop meats.** *Journal of Food Process Engineering* 14(3): 1991: 209-220

The rates of changes of texture, cook drip and free fatty acid during frozen storage of scallop meats at -30, -18, -12, -8 and -5°C were studied. Both the physical and chemical changes were found to follow first order kinetics. The activation energies for toughness, cook drip and free fatty acid were 43.6, 69.3 and 37.9 kJ/mol, respectively. AA

## Shrimps

880

King (JM), McEvily (AJ) and Radha Iyengar. **Liquid chromatographic determination of the processing aid 4-hexylresorcinol in shrimp.** *Journal of the Association of Official Analytical Chemists* 74(6): 1991: 1003-1005

A rapid, sensitive, liquid chromatographic (LC) method has been developed for detn. of residuals of the processing aid, 4-hexylresorcinol, on shrimp meat. An aqueous homogenate of shrimp meat is extracted with ethyl acetate followed by precolumn preparation on a silica Sep-Pak cartridge. LC detn. is performed with a Nova-Pak C18 column, with UV detection at 214 nm. Sensitivity was 0.006 µg, and recovery from shrimp meat samples of known 4-hexylresorcinol addition was 94%. Shrimp treated with 4-hexylresorcinol under the recommended dip protocol had mean residuals of 1.18 p.p.m., with standard deviation of 0.13 p.p.m. AA

## Squilla

881

Reddy (HRV). **The potential uses of squilla (Stomatopods).** *Seafood Export Journal* 24(7): 1992: 24-25

Annual landings of squilla (somatopod fishery) in India during 1990-91 was estimated as 75000 t. Eventhough adult stomatopods contain about 35% flesh and 45% protein (dry wt.) it is not consumed due to the large number of body spines. Chitin, chitosan and their derivatives which have wide industrial application in photography, chromatography, paper, film and fibres, textile, coagulant, medical, adhesive and coatings.

agriculture and food, could be extracted from squilla. Due to high cost of technology and the seasonal nature of the raw material it is not commercially exploited. GS

## Fish

882

Ayyannan (M), Chellakumar (A), Tamilmani (V) and Udayasoorian (C). **Recycling of poultry waste in integrated fish farming.** *Madras Agricultural Journal* 78(5-8): 1991: 200-203

Feasibility and economic viability in fish-cum-poultry farming in Tamilnadu was studied. By recycling the poultry waste the production of fish was increased by 18%, the production cost reduced from Rs. 5.75 to Rs. 2.00/kg, the input cost reduced to 65% of the total input and net profit of Rs. 17,000/- per ha obtained. GS

883

Gomez-Basauri (JV) and Regenstein (JM). **Processing and frozen storage effects on the iron content of cod and mackerel.** *Journal of Food Science* 57(6): 1992: 1332-1336

Processing and subsequent frozen storage affected the Fe content of cod (*Gadus morhua*) and mackerel (*Scomber scombrus*) muscle tissue. Frame mince was obtained from the bone rack, without the head or viscera remaining, after filleting. Frame mince had significantly higher Fe levels than intact fillets with or without skin or fillets that were subsequently minced. Skin-on fillets had more Fe than skin-off fillets. Cod frame mince had about 50% heme Fe, while mackerel frame mince ranged from 20 - 64%. Nonheme Fe increased during frozen storage due to heme breakdown. Storage above -14°C was more deleterious to the heme molecule than lower temp. (-20°C or -40°C). AA

884

Yoshida (A), Sasaki (K) and Morita (S). **Effects of spices, seasonings and food additives on volatility of volatile acids from fish muscle.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 38(4): 1991: 294-302 (Ja)

Effects of 18 spices, 9 seasonings and 9 food additives on volatility of volatile acids from fish muscle homogenate were examined. Volatile acids were determined on the distillate of homogenated mixture of muscle and a test compound after distillation at 90°C for 30 min. Acetic acid, propionic acid, n-butyric acid and/or n-caproic acid



were vaporized from the muscle homogenate of salmon, tuna, pacific saury and plaice, but hardly from that of mackerel muscle seabream, sardine and yellowtail. Among the species tested, and addition of clove to mackerel muscles released a high concn. of acetic acid, which was originated from clove itself. Increased release of volatile acids from mackerel muscle by addition of seasonings such as Worcester sauce, miso (red), tomato ketchup, white wine or vinegar originated from those in the test compounds and was probably due to decreased pH of the mixture by adding the test compounds. Any food additives tested had no effect on volatility of volatile acids. In the exp. with teh homogenated mixture of mackerel muscle and 8 standard volatile acids, release of volatile acids was increased by an addition of clove, Worcester sauce, tomato ketchup, white wine, vinegar, ascorbic acid or sorbic acid, but decreased by that of vanillin or maltol. Cyclodextrin failed to reduce the release of volatile acids. Volatility of volatile acids was greatly influenced by pH of the homgenated mixture: volatile acids were hardly released about pH 6; *n*-butyric and *n*-caproic acids were released below pH 5; and propionic and *iso*-butyric acids below pH 4. AA

885

Suvendu Bhattacharya, Das (H) and Bose (AN). **Rheological behaviour during extrusion of blends of minced fish and wheat flour.** *Journal of Food Engineering* 15(2); 1992; 123-137

The effect of the extrusion process variables, such as length/diam. (L/D) ratio of the extruder, feed ratio (ratio of the solids of fish and wheat flour), temp. of extrusion, and screw speed on the rheological behaviour of blends of partially dried low-cost minced fish and wheat flour were studied. A single-screw, variable-length extrusion cooker, with a barrel bore of 25 mm was developed for this purpose. Pseudoplastic behaviour was observed during extrusion. The shear rate-shear stress data can be fitted (*r* greater than or equal to 0.93, *p* less than or equal to 0.01) to the power-law model. The L/D ratio of the extruder affects the rheological behaviour of the food dough during extrusion, and hence, the L/D ratio should also be considered as a process variable. A simple mathematical model to predict the rheological properties such as the consistency coeff., flow behaviour index, and apparent viscosity of blends during extrusion, was proposed. AA

## Mackerels

886

Gomez-Basauri (JV) and Regenstein (JM). **Vacuum packaging, ascorbic acid and frozen storage effects on heme and nonheme iron content of**

**mackerel.** *Journal of Food Science* 57(6); 1992; 1337-1339

Vacuum packaging and ascorbic acid were tested for their ability to prevent heme Fe loss in mackerel (*Scomber scombrus*). Vacuum packed samples had less heme breakdown than air packed samples at frozen storage temp. above -20°C. Ascorbic acid protected the heme at all temp. when compared to air or vacuum packed samples. AA

## Salmon

887

Reid (RA) and Durance (TD). **Textural changes of canned chum salmon related to sexual maturity.** *Journal of Food Science* 57(6); 1992; 1340-1342

Eating quality of chum salmon decreases as the fish migrate towards natal streams to spawn. Fish were assigned to maturity grades according to outward appearance and processed according to normal commercial practice. Texture of the canned product was assessed by 9 trained sensory judges and by instrumental texture profile analysis (TPA). Both methods revealed significant differences between grades by the sensory method was more sensitive. Standardization of scores of each judge reduced error due to tendency of judges to use different portions of continuous scoring lines. Major textural changes in canned salmon were not evident before the transition from grade 3, dark to grade 4, spawning fish. AA

## Products

### Fish

#### Surimi

888

Lee (HG), Lee (CM), Chung (KH) and Lavery (SA). **Sodium ascorbate affects surimi gel-forming properties.** *Journal of Food Science* 57(6); 1992; 1343-1347

Effect of sodium-L-ascorbate (SA) on the gel-forming properties of Alaska pollock surimi was studied with respect to optimum level, surimi quality, gel setting, vacuum chopping, freeze-thaw and thermal stabilities, and salt and moisture levels. SA significantly improved gel cohesiveness and sensory firmness of fiberized products with max. strengthening effect at a 0.2% level. Its effectiveness was directly related to surimi quality regardless of vacuum treatment indicating the unimportance of airborne oxygen. Freeze-syneresis promoted by



ascorbate during frozen storage was moderated by the use of hydroxypropylated-modified starch. AA

## PROTEIN FOODS

889

Harvey (RA) and Theuer (RC). **Potassium as an index of fruit content in baby food products. Part I. Banana-containing and apricot-containing products.** *Journal of the Association of Official Analytical Chemists* 74(6): 1991: 929-932

### Infant foods

890

Park (YW). **Relative buffering capacity of goat milk, cow milk, soy-based infant formulas, and commercial nonprescription antacid drugs.** *Journal of Dairy Science* 74(10): 1991: 3326-3333

Buffering capacities of goat milk (Alpine, Nubian), cow milk (Holstein, Jersey), soy-based infant formulas, and non-prescription antacid drugs were estimated. Total N, protein, NPN, and  $P_2O_5$  as major buffering entities were quantified for each milk category. Nubian goat milk had the highest levels of the 3 major buffering chemical entities, and the infant formulas contained less total N and NPN compared with natural goat and cow milks. Buffering capacities of the formulas also were lower than those of natural milks. Combinations of milk and antacid drugs had higher buffering capacities than either the milk or drug alone. Drug plus goat milk combinations upon addition of more than 2 ml of acid titrant exhibited fewer changes in pH than the respective drug plus cow milk combinations. AA

## ALCOHOLIC AND NON-ALCOHOLIC BEVERAGES

### Alcoholic beverages

#### Beer

891

Langstaff (SA), Guinard (J-X) and Lewis (MJ). **Instrumental evaluation of the mouthfeel of beer and correlation with sensory evaluation.** *Journal of the Institute of Brewing* 97(6): 1991: 427-433

Physical and chemical measurements were made on a set of 30 beers which had previously been used to characterize the sensory attributes of the mouthfeel of beer using descriptive analysis techniques; these measurements were then correlated with the sensory attributes. By principal component

analysis of the physical and chemical data it was found that the first principal component (PC) was a function of dissolved substances in the beer and the second PC was a function of degree of fermentation. When principal component analysis was performed on the combined sensory and instrumental data, the 30 beers displayed clustering in the PC space based on beer type. AA

892

Ormrod (IHL), Lalor (EF) and Sharpe (FR). **The release of yeast proteolytic enzymes into beer.** *Journal of the Institute of Brewing* 97(6): 1991: 441-443

A simple assay to screen brewing yeast for the release of proteases into beer is outlined and the impact of the yeast proteases on beer foam stability is discussed. AA

### Wines

893

Workman (DS) and Morris (JR). **Storage stability of wine coolers as influenced by juice content and citric acid addition.** *Journal of Food Quality* 15(1): 1992: 39-52

Formulations of four flavours of wine coolers, apple, grape, pineapple and citrus, with 10, 50% fruit juice, 0.2 - 0.4% citric acid were stored at 3°C, 21°C for 10 months, at 37°C for 4 months. They showed changes in colour and decreases in pH and carbonation levels. Coolers with 50% juice levels were less stable and scored low for quality. The pineapple coolers with 0.4% citric acid scored significantly higher for flavour. SD

### Non-alcoholic beverages

#### Cider

894

Gomis (DB), Guiterrez (MD), Moran (MJ), Moreno (J), Dapena (E), Cabranes (C), Alonso (JM). **Analytical control of cider production by two technological methods.** *Journal of the Institute of Brewing* 97(6): 1991: 453-456

Two cider-production procedures involving direct fermentation of apple juice and a prefermentative clarification step or defecation were controlled microbiologically, while chemical monitoring of the major sugars, polyalcohols and organic acids produced during the fermentation was carried out by HPLC. The defecation process markedly slows down alcoholic fermentation and the malolactic conversion. Good correlations between the contents

of D(-) lactate and volatile acidity were obtained for the ciders studied, which indicates that the increased volatile acidity were obtained for the ciders studied, which indicates that the increased volatile acidity of the ciders was basically a result of metabolism mediated by lactic-acid bacteria, the yield being higher in barrels where enzymatic defecation was not applied. Sucrose was rapidly hydrolysed in the first step of the fermentation process, while glucose is the preferential carbon source for the yeasts. Citric acid was produced by the yeasts in the first step of the fermentation process and was later taken up by these microorganisms. Conversion of quinic and shikimic acids seemed to point to a significant activity of heterofermentative lactic-acid bacteria in storage and maturation of ciders. AA

## Coffee

895

Lee (TA), Kempthorne (R) and Hardy (JK). **Compositional changes in brewed coffee as a function of brewing time.** *Journal of Food Science* 57(6): 1992: 1417-1419

Variations in the composition of brewed coffee as a function of brewing time were monitored using GC-MS. Batches of coffee were produced using flow rates of 50 - 500 mL/min, which resulted in brewtimes of 4.42 - 31.07 min. While most components increased in concn. with longer brewing times, several showed significant losses beyond 8 min, indicating an optimum brewtime of 7 - 9 min. AA

896

Holscher (W), Vitzthum (OG) and Steinhart (H). **Prenyl alcohol - source for odorants in roasted coffee.** *Journal of Agricultural and Food Chemistry* 40(4): 1992: 655-658

The identification and characterization of the sulphur-containing flavour components 3-methyl-2-buten-1-thiol, 3-mercapto-3-methylbutanol, and 3-mercapto-3-methylbutyl formate are described. The volatiles were isolated by simultaneous distillation/extraction. After pre-separation by means of column chromatography, preparative HPLC, and GC, the aroma extracts were investigated by capillary GC, GC-MS, and simultaneous GC/sniffing. Identification was carried out by retention and spectroscopic data. The proposed structures were confirmed by synthesis. The results of sensory trials indicate that these components may contribute to the flavour of roasted coffee. As the identified components are very likely to be related to each other by their common precursor prenyl

alcohol (3-methyl-2-buten-1-ol), the formation pathway was investigated by means of model reactions. AA

897

Da Porto (C), Nicoli (MC), Severini (C), Sensidoni (A) and Lerici (CR). **Study on physical and physicochemical changes in coffee beans during roasting. Note 2.** *Italian Journal of Food Science* 3(3): 1991: 197-207

During a roasting process carried out in a pilot plant, coffee beans were removed at different times in order to obtain samples with different degrees of roasting from light to very dark. Various physical and chemical changes in these samples were evaluated. Colour, expressed in Commission Internationale d'Eclairage (C.I.E.) parameters ( $L^*a^*b^*$ ), showed interesting differences between the ground coffee and coffee beans. These changes were shown to decrease in relation to the increase in the degree of roast. Furthermore the content of the main aliphatic acids, which are completely extracted in hot water, were considered. Citric, malic, acetic, lactic and fumaric acids of coffee brew, as well as their contribution to the total acidity, were evaluated in coffee samples with different degrees of roasting. The principal acids were citric and malic, which decrease considerably during roasting. Acetic and fumaric acids had a max. at about 14 - 15% of total wt. loss, while lactic acid increased. The contribution of these acids to the titratable acidity at pH 7.00 was calculated. These results related only to aliphatic acids do not allow the acidity observed in coffee brew obtained from coffee samples of medium and dark roast to be explained. AA

## Fruit juices

898

Clydesdale (FM), Grover (R), Philipsen (DH) and Fugardi (C). **The effect of colour on thirst quenching, sweetness, acceptability and flavour intensity in fruit punch flavoured beverages.** *Journal of Food Quality* 15(1): 1992: 19-38

A survey conducted with 75 non-food science major students revealed that sweetest beverages and those coloured brown, red and orange would satisfy the thirst most. In order to test the concept a preliminary study with three sensory panels of 20 subjects was carried out to standardize the appropriate colour space, levels of acid and sugar in a dry fruit punch beverage. Finally 3 large consumer panels of 59 - 121 subjects provided data which indicated that colour was related to quality characteristics other than appearance and should be considered in decisions affecting such characteristics. SD



## Orange juices

899

Pieper (G), Borguidd (L), Ackermann (P) and Fellers (P). **Absorption of aroma volatiles of orange juice into laminated carbon packages did not affect sensory quality.** *Journal of Food Science* 57(6); 1992: 1408-1411

Orange juice (OJ) was stored in glass bottles and polyethylene/barrier material laminated cartons at 4°C for 24 wks. Studies carried out on the absorption of 19 OJ aroma compounds (eg., ethyl butyrate, d-limonene) into LDPE showed a reduction of d-limonene of up to 50% by absorption into LDPE inside coating. Absorption of OJ aroma compounds into laminated cardboard packages was strictly dependent on type of aroma compound and its solubility in the absorbing layer. Absorption generally decreased from hydrocarbons, ketones, and aldehydes to alcohols and esters. Ethyl butyrate was not absorbed into LDPE in measureable quantity. Sensory panelists did not distinguish between OJ stored in glass bottles and that stored in laminated cardboard packages with LDPE. BV

900

Lee (HY). **Antioxidative activity of browning reaction products isolated from storage-aged orange juice.** *Journal of Agricultural and Food Chemistry* 40(4); 1992: 550-552

The antioxidative activity of methanol extracts of browning reaction products isolated from stored orange juice on the oxidation of linoleic acid was investigated at pH 8.0. The antioxidative activity was assessed by conjugated diene formation from peroxidation of linoleic acid at 40°C. Quantitative changes in linoleic acid were also measured by reversed-phase HPLC. Browning reaction products were found to possess potent antioxidant activity as measured by peroxidation of linoleic acid. The antioxidative activity of browning reaction products was stronger than that of BHA but weaker than that of  $\alpha$ -tocopherol at the 0.01% level. The antioxidant effect of browning reaction products appears to increase as juice browning increases. Further fractionation of browning reaction products on a Sep-Pak C<sub>18</sub> cartridge followed by antioxidative assay revealed that the most effective antioxidant fractions were extracted by 10% and 20% ethyl acetate in hexane and 100% methanol. AA

## Tea

901

Owuor (PO) and Orchard (JE). **Effects of storage time in a two-stage withering process on the quality of seedling black tea.** *Food Chemistry* 45(1); 1992: 45-49

Plain black teas withered in 2-stage between 0 - 18 h showed no loss or improvement in quality. Group I volatile flavour compounds (VFC) decreased much higher than the group II VFC with chemical withering time resulting in improvement of flavour index but the changes in the VFC did not change significantly the taste quality. SD

902

Shigematsu (H), Shimoda (M), Yoshitake (K) and Osajima (Y). **Odor-characterization of green tea by multivariate analysis of sensory data.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 38(4); 1991: 309-315 (Ja)

In order to elucidate odor-characteristics of green tea, odor-descriptive terms for sensory evaluation of green tea flavour were characterized, and data of sensory evaluation of 60 green tea samples by 5 expert panelists were analyzed by Quantification theory 3 (Quant. 3) and cluster analysis. (1) Images for the terms with unpleasant odor showed small differences among the panelists, but images for the pleasant terms showed accordance among the panelists. (2) On the first and second axes by the Quant. 3, green tea samples were grouped into Gyokuro with their attribute of "Ooika", high grade Sencha very rich in "Chanokaori", "Sinsenka" and "Mirumeka", and middle or lower grade Sencha with defective factors such as "Kowabasyu", "Ichyoka", "Aosyu" and "Ishu". (3) Green tea samples were classified into 8 groups by cluster analysis which was done on the scores from the first to third axis obtained by Quant. 3 including over 80% of total information. AA

## FATS AND OILS

903

Nigam (SK) and Misra (G). **Ornamentals - possible source of fat and protein.** *Journal of the Oil Technologists Association of India* 24(1); 1992: 17-18

Fat, fatty acids and protein content of seeds of ornamental flowers like dahlia (Compositae), hollyhack (*Althaea rosea*, Malvaceae), lupin (*Lupinus Leguminosae*), morning glory (*Ipomea purpurea* Convulvulaceae) and Cosmos (Compositae) were analysed. The seeds of cosmos and dahlia yielded substantial amount of fat, 16 - 18% and that of morning glory 10%. The defatted seed meals were rich in protein (20.9 to 47.1%).

dahlia seed fat in oleic acid (72.7%) and lupin and morning glory in saturated acids. GS

## Fats

904

Bhattacharyya (S) and Bhattacharyya (DK). **Plastic fats from some saturated acid rich fats by 1,3-specific lipase interesterification and by blending.** *Journal of the Oil Technologists Association of India* 24(1): 1992: 19-20, 22

Plastic fats from saturated acid rich fats from sal, mango and palm was prepared by interesterifying appropriate blends by 1,3-specific lipase and by blending the original fats with the enzymatically interesterified fats. Sal fat, after enzymatic interesterification had its slip melting point raised by 3.5°C and that of mango kernel fat by 2°C. SFI values were lowered at all temp. between 15 to 35°C. A blend of sal fat and palm oil in 1:1 proportion produced a low melting short range plastic fat and a blend of sal fat and mango kernel fat in 2:3 proportion a product like vanaspathi. GS

905

Ulberth (F) and Haider (H-J). **Determination of low level trans unsaturation in fats by Fourier transform infrared spectroscopy.** *Journal of Food Science* 57(6): 1992: 1444-1447

Fourier Transform infrared spectroscopy (FTIR) was an excellent tool for rapid detn. of trans unsaturation in edible fats. Methyl esters were determined as a neat sol., thereby avoiding cumbersome weighing operations and handling of CS<sub>2</sub>. The method was calibrated by gravimetrically prepared mixtures of methyl elaidat in methyl esters of a trans fatty acid (TFA) free soy oil. In contrast to TFA concn. > 10%, which could be determined easily by the classic baseline technique, low TFA values were only quantifiable (with high accuracy) after a computer-assisted spectral subtraction procedure. AA

906

Wen (MC) and Kinsella (JE). **Fatty acid composition of suspension cell cultures of *Theobroma cacao* are altered by culture conditions.** *Journal of Food Science* 57(6): 1992: 1452-1453, 1457

Reports the effect of culture conditions on the lipid content and composition of cultured cells of *Th. cacao*. The triglyceride content of cacao suspension cell cultures increased from 0.6 to 2.3% by the addition of coconut water (CW), and by reducing the agitation rate. Culturing of cacao cells in media

containing 0.50% casein hydrolysate, palmitic acid content of total lipids decreased from 28% to 17%. Addition of CW, oleic acid showed an increase from 10% to 45% and decrease in linolenic acid by the addition of CW or by omitting sucrose was noticed. GS

## Oils

907

Adhikari (S) and Adhikari (J). **Methods for the detection/estimation of admixed vegetable oils.** *Journal of the Oil Technologists Association of India* 24(2): 1992: 39-43

New analytical methods, the first for the detection of palmolein adulteration in groundnut oil using silver nitrate TLC, the second for ambadi oil (*Hibiscus cannabinus*) in other vegetable oils using colour reaction and spectrophotometry and the third for mustard oil in rice bran-mustard blends using spectrophotometry are presented and claimed as sensitive, selective, quick and suitable for routine application. SD

908

Raut (SD), Patil (MN) and Jaiswal (PK). **Detection of water-melon seed oil in groundnut and sesame oils.** *Journal of the Oil Technologists Association of India* 24(2): 1992: 57-58

A simple TLC method detects water-melon seed oil upto 5% in groundnut and sesame oils. It involves extraction of unsaponifiable matter; spotting on silica gel-G coated TLC plates, and development with hexane and ethyl acetate (60:40) mixture; and visualisation of spots with a spraying agent. SD

909

Wang (Y) and Gordon (MH). **Effect of phospholipids on enzyme-catalyzed transesterification of oils.** *Journal of the American Oil Chemist's Society* 68(8): 1991: 588-590

The effect of phosphatidylcholine (PC), phosphatidylethanolamine (PE) and phosphatidylinositol (PI) on the activity of an immobilized lipase, lipozyme, during transesterification of oils has been studied. PC concn. < 0.05% did not affect the initial rate of transesterification. Higher concn. of PC as well as PE and PI-rich phospholipids at the 0.5% level caused a reduction in the initial reaction rate, but after 10 h transesterification had progressed to the same extent as the control sample. Reuse of lipozyme for 10 batch reactions showed that a PC content of < 0.05% did not cause significant inactivation of the enzyme, but PC contents above



this level caused progressive inactivation of the enzyme and the inactivation increased with PC content. The ability of phospholipids to inactivate the lipozyme was in the order PE > PC > PI. Variation in the acyl groups of PC did not significantly affect inactivation of the enzyme. It is concluded that the phospholipid content of edible oils should be reduced below 200 p.p.m. by degumming if unacceptable inactivation of lipozyme is to be avoided. AA

910  
Rittner (H). **Extraction of vegetable oils with ethyl alcohol.** *Oleagineux* 47(1): 1992: 29-42

A detailed study of different aspects of vegetable oil extraction using ethyl alcohol in batch processing units and in installations equipped with conventional extractors can be easily adaptable for use with ethyl alcohol, with few modification and additions to the equipment is presented. Using ethyl alcohol as an extraction solvent can prove particularly worthwhile in countries that produce ethyl alcohol but import hexane, or for small capacity batch processing installations, where it is particularly easy to work at pressures of around 20 to 30 psig, which considerably increase oil solubility in the alcohol, therefore improving extraction yields. BV

## Coconut oils

911  
Gordon (MH) and Rehman (IA). **Effect of processing on the composition and oxidative stability of coconut oil.** *Journal of the American Oil Chemist's Society* 68(8): 1991: 574-576

Discusses the oxidative stability, composition of coconut oil during the bleaching of oil degummed with phosphoric acid; during alkali refining; during the deodorization of oil degummed with citric acid and bleached; and during the deodorization of oil processed with a combined phosphoric acid degumming and bleaching operation. Residual traces of citric acid or phosphoric acid play an important role in stabilizing processed oils. A combined phosphoric acid degumming and bleaching process leads to smaller losses of tocopherols than sequential treatments. BV

912  
Gordon (MH) and Rahman (I). **Effects of minor components on the crystallization of coconut oil.** *Journal of the American Oil Chemist's Society* 68(8): 1991: 577-579

Reports the changes in the crystallization of coconut oil due to refining and the effects of diacylglycerols, free fatty acids and phospholipids on oil crystallization. BV

## Groundnut oils

913  
Husain (S). **Detection of castor oil adulteration in groundnut oil - a case study.** *Journal of the Oil Technologists Association of India* 24(2): 1992: 49-51

A new <sup>13</sup>C-NMR spectroscopy method, being rapid and cost effective, is claimed to be capable of giving absolute identity of castor oil in an edible oil sample down to the level of 3%. SD

## Olive oils

914  
Goncalves (M), Vasconcelos (AMP), Gomes de Azevedo (EJS), Chaves das Neves (HJ) and Nunes da Ponte (M). **On the application of supercritical fluid extraction to the deacidification of olive oils.** *Journal of the American Oil Chemist's Society* 68(7): 1991: 474-480

## Palm oils

915  
Thomas (PP), Gopalakrishnan (N) and Damodaran (AD). **An integrated dry process for palm oil and kernel oil extraction.** *Journal of the Oil Technologists Association of India* 24(1): 1992: 3-5

An integrated process was developed for palm oil and palm kernel oil production using microwave energy for sterilization, loosening and drying of the fruits. The time taken for the loosening varied from 3 to 5 min exposure depending upon wt. of the spikelets as against the conventional one requiring 20 - 30 min. Moisture content of the fresh fruit including shell and kernel was 30% which when exposed to microwaves reduced to 0.9, after 240 sec. To reduce the quantity of petroleum solvent used in the extraction, part of the oil can be removed by hydraulic pressing. The problem of effluent treatment does not exist in this dry process. Fibre, seed shells and fine particles obtained as byproducts, can be used as fuel. GS

916  
Gopalakrishnan (N) and Thomas (PP). **Study of the oil obtained from the oil palm fruit processed with microwave energy.** *Journal of the Oil Technologists Association of India* 24(2): 1992: 45-47

The oil obtained by an integrated dry process from the oil palm fruit using microwave energy was analysed for any chemical changes occurring due to the exposure to microwave energy. It was found that the glycerides or the fatty acids were not affected by microwave energy, whereas a possible chemical degradation of the carotenoids was noticed. The other quality parameters of microwave processed palm oil resembled with those of the conventional palm oil. AA

917

Yoshida (H), Tatsumi (M) and Kajimoto (G). **Relationship between oxidative stability of vitamin E and production of fatty acids in oils during microwave heating.** *Journal of the American Oil Chemist's Society* 68(8): 1991: 566-570

The stability of tocopherols in vegetable oils (palm oil, safflower oil) decreased in the order  $\delta > \beta > \gamma > \alpha$  due to microwave heating. The order of decrease depended on the chainlength and lower the degree of unsaturation of fatty acid ethylesters, the greater was the reduction in amount of individual tocopherols. The reduction in tocopherols became greater with increasing levels of free fatty acids. BV

#### Rapeseed oils

918

Pathak (PK), Agrawal (YC) and Singh (BPN). **Effect of elevated drying temperature on rapeseed oil quality.** *Journal of the American Oil Chemist's Society* 68(8): 1991: 580-583

Reports on the effect of rapeseed drying temp. (range 50 - 250°C) on oil quality. Elevated drying temp. upto 200°C is recommended for rapeseed without adversely affecting oil quality. Based on this study, a saving up to 80% drying time compared to the present practice of drying rapeseed at a max. temp. of 93°C could be effected. BV

#### Rice bran oils

919

Jayachandra (K) and Azeemoddin (G). **Industrial grade lecithin and powder phosphatides from rice bran oil gums.** *Journal of the Oil Technologists Association of India* 24(1): 1992: 15-16

Lecithin and powder phosphatides were recovered from wet rice bran oil gums (RBOG) from an oil refinery. About 60% of the high water content of RBOG was removed by centrifugation; dried under vacuum at 80°C and designated as lecithin which was unbleached and had pourable consistency. The av. yield of lecithin, on the wt. of the crude gums,

was 20%. Dried gums were treated with chilled acetone, stirred well, allowed to settle for 4 h and phosphatides a yellow powder produced. The dried gum contained 3.16% phosphatides. GS

920

Vedanayagam (HS). **A rapid and simple method for the estimation of oil and free fatty acids in rice bran.** *Journal of the Oil Technologists Association of India* 24(1): 1992: 21-22

A rapid and simple method was developed to estimate the oil and free fatty acid contents in rice bran. The oil obtained by percolating hexane through a column of bran placed in a burette was desolventized, weighed and titrated for free fatty acid content. This method requires only half an hour compared to 4 hr by the conventional soxhlet extraction. The results are reproducible and comparable to those obtained by the AOCS methods. AA

921

Thomas (PP), Gopalakrishnan (N) and Damodaran (AD). **Rice bran lipase inactivation by microwaves for low FFA oil.** *Oleagineux* 46(6): 1991: 245-246

Rice bran lipase can be inactivated uniformly for low free fatty acid (FFA) oil by direct exposure to microwaves if the storage period of bran is within 2 wks. If the storage period of bran is about 8 wks, moistening the bran and immediate exposure to microwave for a longer duration is required. Golden yellow coloured oil with 2.0% FFA could be obtained from microwave exposed and stored bran under above conditions. BV

#### Soybean oils

922

Boki (K), Wada (T) and Ohno (S). **Effects of filtration through activated carbons on peroxide, thiobarbituric acid and carbonyl values of autoxidized soybean oil.** *Journal of the American Oil Chemist's Society* 68(8): 1991: 561-565

The decreases in peroxide value, thiobarbituric acid value and carbonyl value of autoxidized soybean oil and the physical and chemical properties of activated carbons, the results indicate that hydroperoxides, aldehydes and ketones were adsorbed on the acid sites distributed over the surface or within the pores of the activated carbons while the autoxidized soybean oil flowed through the packed column. The results of residual amounts of tocopherols and stability tests suggest that  $\delta$ -tocopherol at concn. of < 100  $\mu\text{g/g}$  had no effect on oxidative stability of soybean oil and that it was



chemically more stable than  $\alpha$ -,  $\beta$ - and  $\gamma$ -tocopherols. BV

923

Lee (H), Chung (BH) and Park (YH). **Concentration of tocopherols from soybean sludge by supercritical carbon dioxide.** *Journal of the American Oil Chemist's Society* 68(8); 1991: 571-573

A supercritical fluid extraction method has been applied to test the feasibility of tocopherol concn. from soybean sludge with CO<sub>2</sub> at temp. and pressures ranging from 35 to 70°C and 200 to 400 bar, respectively. The supercritical solubility of the esterified soybean sludge was over 4 - 6 times > that of the original soybean sludge. By a simple batch-type one-stage method the tocopherols in the esterified soybean sludge could be conc. up to 40 wt%. The overall results of the present study show that soybean sludge initially containing about 13 - 14 wt% tocopherols may require a countercurrent multistage column to be highly and effectively conc. AA

924

Koga (Y), Ike (M) and Iwamoto (H). **Influence of different rancidities of soybean oil on the quality of fried materials.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 38(3); 1991: 202-210

This study was subjected to compare the qualities of food materials fried by soybean oils with different rancidity. Tofu and egg white gel without any batter were fried with the three types of soybean oils, namely fresh oil ((S-0), foam extension length 27 mm) and two deteriorated oils prepared by heating under air bubbling for 20 and 25 h (S-20 and S-25, foam extension length 32 and 40 mm), respectively. The quality of fried materials was evaluated by quantitative analysis of absorbed oil, measurement with a Texturometer, and histological observation. The results of this exp. indicated that the quality of the fried materials declined steadily from S-0 to S-20 with heating time, and abruptly to S-25 oil by more 5 h heating. Soybean oil was proposed to use for frying food materials as S-0 to S-20 oil (foam extension length 32 mm) in this exp. This seems to be one of the beneficial factors for the quality control of fried food materials in food service industries. AA

## Sunflower oils

925

Vasishtha (AK), Bajpai (M) and Singh (C). **Variations in the characteristics and oil compositions in different genetic varieties of sunflower.** *Journal of the Oil Technologists Association of India* 24(1); 1992: 9-14

Analysis of 30 var. of sunflower (*Helianthus annuus* L.) seed showed that oil content ranged between 24.1% (var. KSP-9) and 50.4% (var. 1701), protein content from 9.2% (var. 1701) to 28.8% (var. KSP-9, KSP-11). Sunflower oil contained saturated fatty acids (SFA) viz. palmitic, stearic, arachidic and lignoceric acid and unsaturated fatty acids (UFA) viz. oleic and linoleic acids. The total SFA in the oils varied between 10.7 and 17.9%; and among the UFA the linoleic acid is predominant. GS

## Shortenings

926

Levri (EA), Patrascu (L) and Kelch (WJ). **Peroxide stability in shortening: A useful reference material.** *Journal of Food Protection* 54(11); 1991: 897-899

Vegetable shortening was studied to determine if its peroxide value (PV) was stable enough after storage for 1 yr to be used as a quality control reference material. Shortening samples were deliberately oxidized to contain low, medium, and high levels of peroxide and were then stored at 4°C for 1 yr. PV was measured approx. every 14 days during the yr. A total of 27 different detn. was made at each of the 3 different peroxide levels. The results indicated min. variability within each level of peroxide during the yr, and suggested that shortening would serve well as a reference material for quality control in the fats and oils industry and in food and nutrition research. AA

## SPICES AND CONDIMENTS

### Spices

#### Garlic

927

Verghese (J). **Garlic.** *Indian Spices* 29(2); 1992: 4-7, 16

Botanic diagnosis, propogation, dehydrated garlic, allinase and cystein sulfoxides, garlic oil, garlic oleoresin, and encapsulated garlic flavours are the topics covered. SRA

#### Moringa oleifera

928

D'Souza (J) and Kulkarni (AR). **Comparative studies on nutritive values of tender foliage of seedlings and mature plants of Moringa oleifera**

Seedlings foliage of *M. oleifera* (Lamk) is richer in protein (2.8 - 5.8%), lipid (530 - 670 mg/100 g), vitamin A, B<sub>1</sub>, B<sub>6</sub> and C content (nearly double), fibre and ash content lesser than that of mature trees. Vitamin B and C being higher than vitamin A, all are comparable to that of green vegetables. GS

## Paprika

929

Biacs (PA), Czinkotai (B) and Hoschke (A). **Factors affecting stability of colored substances in paprika powders.** *Journal of Agricultural and Food Chemistry* 40(3): 1992: 363-367

A study was undertaken to investigate the change in carotenoid pigment as well as natural effective antioxidant content of paprika during fruit ripening and storage period of the ground products. By means of modern analytical procedure, paprika fruit was found to contain  $\alpha$ -tocopherol in the pericarp and  $\gamma$ -tocopherol in the seeds. Ascorbic acid approached max. level when the fruit turned red and then declined. Both antioxidants when added to the ground products have substantially reduced colour impairment occurring during storage. The colour degradation was estimated after 150 days of storage to be 27%, 20% and 15% at ambient storage conditions and 15%, 13% and 5% under refrigeration in untreated,  $\delta$ -tocopherol-treated, and ascorbic acid-treated powders, respectively. Among different paprika cvs the seeds of F-03 (hot) showed the highest level of tocopherol content, and the powder of such cv showed the lowest degradation of carotenoid pigments during storage. AA

## Pepper

930

Sreekumari (KR), Venugopal (G), Paul (SM) and Sivadasan (CR). **Total microbial load, *Salmonella*, *Escherichia coli* moisture content in black pepper.** *Indian Spices* 29(2): 1992: 8-10

In view of the quality evaluation and upgradation Spices Board Lab. surveyed the microbial load and moisture in black pepper at various levels - growers, traders and exporters. Most of the samples from the growers (97.32%) remained within the tolerance limit. Only few samples (2.68%) harboured more than  $10^6$  cfu/g. None of the trader's samples contained bacteria more than  $10^5$ /g. Most of them (80.85%) were falling in the range of  $10^4$  and  $10^5$ /g. Moisture and microbial loads were within the limits in all the samples. SRA

931

Shanthi Narasimhan, Rajalakshmi (D) and Nagin Chand. **Quality of powdered black pepper (*Piper nigrum* L.) during storage. II. Principal components analyses of GC and sensory profiles.** *Journal of Food Quality* 15(1): 1992: 67-83

Gas chromatographic fingerprinting of stored black pepper powder after extraction, volatiles from the Likens-Nickerson extraction and aroma impact fractions were carried out using packed column, routinely used in the spice growing countries. Sensory quality, volatile oil and moisture content were also analyzed to trace the changes occurring during storage. The data generated were subjected to principal components analyses to reduce dimensionality and arrive at impact attributes. The oxygenated compounds fraction resolved into 25 to 30 peaks from which a group of 6, including small yet important peaks, was selected. These peaks reflected quality as monitored by sensory response, accounting for 93.4% of information, and are more meaningful than terpene hydrocarbon peaks of high resolution. The probable compounds constituting these principal components are discussed. AA

## SENSORY EVALUATION

932

Yau (NJJ) and McDaniel (MR). **Carbonation interactions with sweetness and sourness.** *Journal of Food Science* 57(6): 1992: 1412-1416

The effects of CO<sub>2</sub> level on sweetness and of sweetener level on carbonation perception were measured in two sweetened systems. The effects of CO<sub>2</sub> level on sourness and of acid level on carbonation perception were measured in two acidulated systems. The effects were measured at concn. in ranges of 2 - 16% (w/v) sucrose, 0.015 - 0.12% (w/v) aspartame, 0.02 - 0.29% (w/v) citric acid, and 0.015 - 0.06% (v/v) phosphoric acid. Little effect of carbonation on sweetness was found in either sweetened system. Sucrose at 16% (w/v) reduced carbonation perception. Carbonation enhanced sourness ratings at the lower acid levels and had no effect at higher acid levels for either acid. No effect of acid level on carbonation perception was found. AA

933

Conner (MT) and Booth (DA). **Combined measurement of food taste and consumer preference in the individual. Reliability, precision and stability data.** *Journal of Food Quality* 15(1): 1992: 1-17



The concept that a consumer knows the levels of sensed characteristics in foods was tested by collecting the preferences for the levels of salt in bread and sugar in chocolate, lime drink and tomato soup on a 100 mm line scale with just right category at the centre and rejection categories at the extreme ends. The results confirmed that in the absence of contextual biases, the ratings relative to stable anchor categories of choice behaviour are linear with discriminate differences in the described characteristic. SD

934

Marin (AB), Barnard (J), Darlington (RB) and Acree (TE). **Sensory thresholds: Estimation from dose-response curves.** *Journal of Sensory Studies* 6(4): 1991: 205-225

Thresholds were determined by methods A, B and C by detecting 1,8-cineole added to Concord grape juice presented in a semi-ascending paired design. Method A being a non-zero response test, yielded only an interval estimate whose mid points decreased with increasing sample size. Methods B, being a 2-phase linear model fitted to data and C a logistic model to show max. curvature, gave comparable threshold values which did not decrease with increasing sample size. SD

935

Shepherd (R), Farleigh (CA) and Wharf (SG). **Effect of quantity consumed on measures of liking for salt concentrations in soup.** *Journal of Sensory Studies* 6(4): 1991: 227-238

The effect of ingestion on the relative-to-ideal ratings of salt in tomato soup was studied in the 2 experiments in which 30 panelists rated the samples firstly at the first sip and again at the end of consuming 200 g of each sample as 'just right', 'not nearly salty enough' and 'much too salty'. In the first experiment samples with varying salt content were given together in random order while in the second experiment the samples one by one. The results showed that the use of small samples related reasonably well to the final rating as the realistic measure of liking and also resulted in a higher ideal concn. of salt in the food. SD

936

Gatchalian (MM), De Leon (SY) and Yano (T). **Control chart technique: A feasible approach to measurement of panellist performance in product profile development.** *Journal of Sensory Studies* 6(4): 1991: 239-254

Quantitative descriptive scores provided by trained panelists for young coconut were analysed by control chart (CC) method and analysis of variance (ANOVA) method. Both methods reflected the product quality in the same manner but the vol. of data to be handled in ANOVA is more and CC easier and interesting to apply for testing the panel performance, individual consistency and agreement between them. SD

## FOOD STORAGE

937

Krishnamurthy (TS), Narasimhan (KS) and Muralidharan (N). **A quick method for monitoring carbon dioxide in controlled atmosphere storage of foodgrains.** *Research and Industry, India* 37(3): 1992: 184-186

CO<sub>2</sub> levels in controlled atm. storage of foodgrains were estimated by a quick and efficient volumetric method using an alkali solution. The kit with hypodermic syringes is easy to adopt, accurate and also cost-effective compared to other methods using infrared gas analyser, indicator tube, interferometer and chemoassay. GS

## INFESTATION CONTROL AND PESTICIDES

938

Rajasri (M), Reddy (GPV), Krishnamurthy (MM) and Deva Prasad (V). **Bioefficacy of certain newer insecticides including neem products against chilli pest complex.** *Indian Cocoa, Arecanut* 15(2): 1991: 42-44

Efficiency of foliar sprays, 6 synthetic organic insecticides, 4 neem preparations and 1 chitin inhibitor were evaluated for control of pests of chilli (*Capsicum annum* L.). Results indicated that triazophos and phosalone (0.1%) sprays were effective against sucking pests, thrips, aphids (upto 90% mortality) and mites (> 75% mortality). amitraz (0.1%) against mites (78% mortality), triazophos (0.1%), trabon (0.01%) and fenvalerate (0.01%) against pod borers (*Heliothis armigera* and *Spodoptera litura*) and chitin inhibitor, duphar (0.1% spray) least effective. Synthetic insecticides were better than neem preparations. GS

939

Uma Mageshwari (S) and Tamilarasi (P). **Dietary sodium intake in normal and selected diabetics, hypertensives and hypertensives with diabetes.** *Indian Journal of Nutrition and Dietetics* 27(7): 1990: 200-204

The pattern of dietary intake of Na in healthy persons, hypertensives, diabetics and patients with both diabetes mellitus and hypertension were studied. The hypertensives and diabetics consumed more salt (higher than the required amount) than the rest. Consumption of Na was less with vegetarians than non-vegetarians (animal food contains more of Na). Patients with both diabetes and hypertension consumed less Na than others. Nutrition education and dietary counselling to patients are essential to maintain health conditions. GS

940

Prasad (RBN), Manjula (K), Krishnamurthy (A) and Lakshminarayana (G). **Preparation and surfactant properties of N-acyl condensates of neem seed protein isolate and hydrolysate.** *Journal of the Oil Technologists Association of India* 24(2): 1992: 55-56

N-acyl condensates were prepared by reacting neem protein isolate and the hydrolysate separately with lauric, palmitic and stearic acids. All the products were evaluated as their Na salts for surface tension, emulsification, wetting and foaming properties. Condensates of the isolate were better than the hydrolysate condensates in emulsification power and of the hydrolysate better than the isolate condensates in wetting ability. N-lauroyl condensates showed better surfactant properties than the palmitoyl and stearyl condensates. N-lauroyl condensates of the hydrolysate was better than Na lauryl sulphate in reducing surface tension and increasing wetting. AA

941

Mauri (LM), Alzamora (SM) and Tomio (JM). **Effect of electrolytes on the kinetics of thiamine loss in model systems of high water activity.** *Food Chemistry* 45(1): 1992: 19-23

The study on the influence of electrolytes NaCl, KCl and Na<sub>2</sub>SO<sub>4</sub> in model systems of reduced  $a_w = 0.95$  at pH 4.0 and 5.5 and processing temp. 80, 90 and 100°C confirmed a first order reaction kinetics for thiamine degradation. The  $a_w$  alone is not useful for predicting thiamine stability and so the effect of the

solute 'per se' must be considered for further study. SD

942

Hamada (JS). **Peptidoglutaminase deamidation of proteins and protein hydrolysates for improved food use.** *Journal of the American Oil Chemists Society* 68(7): 1991: 459-462

The limited deamidating ability of peptidoglutaminase (PGase) toward intact food proteins (0 - 6% deamidation) can be significantly enhanced by prior protein hydrolysis and altering protein conformation by such means as moist heat. PGase deamidation increases protein solubility and improves emulsifying and other physical properties under mildly acidic conditions. A batch reactor method was developed for the large-scale PGase deamidation of food proteins. Michaelis-Menten kinetics for industrial reactions (mixed zero- and first-order) were used for predicting the behaviour of the reactor and for calculating enzyme dosage required to completely deaminate a given quantity of protein. Using such a reactor in the deamidation of food proteins or protein hydrolysates can lead to new food proteins with superior functional properties from less functional starting materials. AA

943

Song (J) and Wander (RC). **Effect of dietary selenium and fish oil (MaxEPA) on arachidonic acid metabolism and hemostatic function in rats.** *Journal of Nutrition* 121(3): 1991: 284-292

Male Sprague-Dawley rats were fed for 8 wk semipurified diets containing 7% corn oil or 5.5% fish oil plus 1.5% corn oil with or without selenium supplementation. The diets caused no difference in wt. gain, food intake or plasma malondialdehyde content. The data obtained suggest that the effect of dietary selenium on hemostatic function and the production of eicosanoids is minor. SD

944

Nishina (PM), Schneeman (BO) and Freeland (RA). **Effects of dietary fibers on non fasting plasma lipoprotein and apolipoprotein levels in rats.** *Journal of Nutrition* 121(4): 1991: 431-437

Fibre-free (control) diet and 4 other diets viz cellulose, protein, wheat bran and oat bran containing 8% dietary fiber by wt. fed to rats with initial wt. 115 - 130 g for 4 wks showed that the dietary fibers are able to alter non-fasting lipoprotein cholesterol and apolipoproteins and that pectin, a soluble fiber, was most effective in lowering plasma cholesterol levels. SD



Clifford (AJ), Heid (MK), Peerson (JM) and Bills (ND). **Bioavailability of food folates and evaluation of food matrix effects with a rat bioassay.** *Journal of Nutrition* 121(4): 1991: 445-453

Folate bioavailability of beef liver, lima beans, peas, spinach, mushrooms, collards, orange juice and wheat germ was estimated with a protocol of folate depletion-repletion using growth and liver, serum and erythrocyte folate of weanling male rats. Diets with 125, 250 and 375 µg folic acid/kg were standards. Individual foods were incorporated into a folate-free amino acid based diet alone (250 µg folate/kg diet from food) or mixed with folic acid (125 µg folate from food + 125 µg folic acid) to evaluate folate bioavailability and effects of food matrix. Beef liver and orange juice folates were as available as folic acid, whereas those of wheat germ were less bioavailable. Foliates of peas and spinach were also less available than folic acid using liver and serum folate concn. and total liver folate as response criteria, but they were not lower when based on growth and erythrocyte folate concn. Lima bean, mushroom and collard folates were as available as folic acid using 4 or 5 response criteria. Folate bioavailability of all foods generally exceeded 70%. All response criteria gave approx. equivalent results, indicating that growth and tissue folate levels are appropriate criteria. No food matrix effects were observed for any food except lima beans. Foods rich in polyglutamyl folates were less bioavailable than those of foods rich in short-chain folates. AA

946

El-Saadany (SS), El-Massry (RA), Labib (SM) and Sitohy (MZ). **The biochemical role and hypocholesterolaemic potential of the legume *Cassia fistula* in hypercholesterolaemic rats.** *Die Nahrung* 35(8): 1991: 807-815

947

Froseth (BR) and McKay (LL). **Development and application of pFM011 as a possible food-grade cloning vector.** *Journal of Dairy Science* 74(5): 1991: 1445-1453

An origin of replication and a nisin resistance determinant on a 7.6-kb EcoRI fragment, capable of existing as an independent replicon when circularized, was used to construct a vector for

cloning homologous DNA in *Lactococcus lactis* ssp. *lactis*. A medium, designated M17-GTN, was developed to identify *L. lactis* ssp. *lactis* cells containing pFM011 from a mixed population of nisin-sensitive cells and was then used to select nisin-resistant transformants produced by electroporation or by protoplast transformation. To demonstrate the usefulness of nisin resistance as a selectable marker, a 6.3-kb EcoRI fragment encoding reduced bacteriophage sensitivity was cloned into the EcoRI site of pFM011. Separately, the erythromycin resistance marker from pGB301 was cloned into the HindIII site of pFM011. Both plasmids were introduced into *L. lactis* ssp. *lactis*. The origin of replication of pFM011 was localized to a 2.2-kb HindIII-HaeIII fragment. Seven additional unique restriction sites on pFM011 for cloning purposes were added by inserting a multiple cloning site. Results indicated that pFM011 and its recombinant derivatives were relatively stable in the *L. lactis* ssp. *lactis* background. As pFM011 was derived entirely from lactococcal DNA, this study demonstrates its use as a food-grade cloning vector for lactococci. AA

## TOXICOLOGY

Nil

## FOOD LAWS AND REGULATIONS

948

Goodburn (K). **Food irradiation - legislation and consumer acceptability.** *Food Science and Technology Today* 4(2): 1990: 83-87

Briefly covers detection methods, consumer acceptance, consumer resistance, EC directive and UK legislation. BV

949

Cockbill (C). **Food law by the year 2000.** *Food Science and Technology Today* 4(2): 1990: 109-111

Covers briefly trends in food law, training, labelling rules and food law in the European community. BV





# AUTHOR INDEX

- Abichandani (H)  
715
- Ackermann (P)  
899
- Ackland (JD)  
822
- Acree (TE)  
934
- Acuff (GR)  
851
- Adhikari (J)  
907
- Adhikari (S)  
907
- Agrawal (YC)  
918
- Aguerre (RJ)  
788
- Ajay Singh  
796
- Ajlouni (SO)  
729
- Ajuyah (AO)  
867
- Al-Dagal (M)  
843
- Al-Duri (B)  
713
- Aleksandrova (LG)  
721
- Ali (SL)  
787
- Alka Sharma  
753
- Allshouse (RD)  
831
- Alonso (JM)  
894
- Alvarado (JDD)  
789
- Alvarado (R)  
841
- Alvarez (VB)  
865
- Alzamora (SM)  
941
- Anandavally (N)  
876
- Andrieu (J)  
711
- Anzaldúa-Morales  
777
- Asp (N-G)  
800
- Ayyannan (M)  
882
- Ayyasamy (M)  
772
- Azeemoddin (G)  
919
- Bajpai (M)  
925
- Balamurugan (P)  
771 772
- Baldwin (AJ)  
822
- Balestrieri (C)  
790
- Banerjee (D)  
833
- Banerjee (R)  
730
- Bangar (KS)  
803
- Bansal (KN)  
742 749
- Banumathi (P)  
767
- Barnard (J)  
934
- Barreiro (JA)  
786
- Barrera (MR)  
785
- Beck (JV)  
712
- Beecher (GR)  
785
- Beelman (RB)  
729
- Bhasin (AK)  
823
- Bhatia (AK)  
823
- Bhatia (SK)  
710
- Bhattacharyya (BC)  
730
- Bhattacharyya (DK)  
904
- Bhattacharyya (S)  
904
- Biacs (PA)  
929
- Biedrzycki (K)  
856
- Bills (ND)  
945
- Birch (G)  
795
- Bjorck (I)  
800
- Blaschek (HP)  
702
- Bohner (HF)  
733
- Boki (K)  
922
- Bonomi (F)  
826
- Booth (DA)  
933
- Bopaiah (BM)  
794
- Borguidd (L)  
899
- Bose (AN)  
885
- Bourne (MC)  
777
- Bracco (U)  
724
- Bradley (RL)  
733
- Bradley (RLJr)  
832
- Brekke (CJ)  
868
- Briery (P)  
711
- Buazzi (MM)  
736
- Buchanan (DA)  
793
- Bullerman (LB)  
878
- Cabranes (C)  
894
- Caldwell (M)  
805
- Camero (MI)  
847
- Campbell (NF)  
770
- Castaldo (D)  
790
- Causeret (D)  
875

Cebula (DJ)  
 797  
 Chang (CC)  
 874  
 Chang (F-W)  
 748  
 Chang (HH)  
 718  
 Chang (KC)  
 773 774  
 Chang (SW)  
 838  
 Charbonneau (JE)  
 707  
 Chaves das Neves (HJ)  
 914  
 Che Man (YB)  
 766  
 Chellakumar (A)  
 882  
 Chen (CM)  
 844  
 Chen (HC)  
 725  
 Chikubu (S)  
 744  
 Chinnaswami (KN)  
 804  
 Chinnaswamy (R)  
 801  
 Chung (BH)  
 923  
 Chung (KH)  
 888  
 Chung (SL)  
 879  
 Clifford (AJ)  
 945  
 Clydesdale (FM)  
 898  
 Cockbill (C)  
 949  
 Collar (C)  
 807  
 Conner (MT)  
 933  
 Conventry (J)  
 859  
 Cotterill (OJ)  
 874  
 Coulibaly (K)  
 819  
 Cousin (MA)  
 784  
 Czinkotai (B)

929  
 D'Souza (J)  
 928  
 Da Porto (C)  
 897  
 Damodaran (AD)  
 915 921  
 Daniel (YC)  
 843  
 Dapena (E)  
 894  
 Darlington (RB)  
 934  
 Das (AK)  
 741  
 Das (H)  
 885  
 Dave (JM)  
 818  
 Dave (RI)  
 818  
 De (KB)  
 730  
 de Barber (CB)  
 807  
 De Leon (SY)  
 936  
 Deepa Bhajekar  
 731  
 Dev Roy (AK)  
 863  
 Deva Prasad (V)  
 938  
 Dharmadhikari (DN)  
 869  
 Dodd (C)  
 722  
 Dodds (KL)  
 853  
 Donhowe (DP)  
 832  
 Dora (KC)  
 877  
 Dreux (M)  
 762  
 Durance (TD)  
 887  
 Egbert (WR)  
 844  
 El Baya (AW)  
 745  
 El-Massry (RA)  
 946  
 El-Saadany (SS)  
 946

El-Shimi (NM)  
 849  
 Elfakir (C)  
 762  
 Elsamma Job  
 815  
 Farkye (NY)  
 831  
 Farleigh (CA)  
 935  
 Farouk (MM)  
 852  
 Farr (AJ)  
 866  
 Faure (J)  
 744  
 Fellers (P)  
 899  
 Fellman (JK)  
 793  
 Fellows (JW)  
 838  
 Fernando (GD)  
 841  
 Flegler (S)  
 865  
 Fleming (HP)  
 727  
 Floros (JD)  
 784  
 Frank (JF)  
 837  
 Freeland (RA)  
 944  
 Fretzdorff (B)  
 745  
 Froseth (BR)  
 947  
 Fugardi (C)  
 898  
 Fujii (M)  
 860  
 Fung (YC)  
 843  
 Gandara (JS)  
 720  
 Garg (FC)  
 836  
 Gasse (MA)  
 837  
 Gatchalian (MM)  
 936  
 Genovese (MI)  
 769



Ghildyal (NP)  
 775  
 Giangiacomo (R)  
 826  
 Giovane (A)  
 790  
 Golachowski (A)  
 780  
 Goli (MB)  
 785  
 Gomes de Azevedo (EJS)  
 914  
 Gomez-Basauri (JV)  
 883 886  
 Gomis (DB)  
 894  
 Goncalves (M)  
 914  
 Goodburn (K)  
 948  
 Gopalakrishnan (N)  
 915 916 921  
 Gordon (MH)  
 909 911 912  
 Gormley (R)  
 701  
 Gourama (H)  
 878  
 Grimmelt (B)  
 763  
 Grover (PD)  
 738  
 Grover (R)  
 898  
 Gruchala (L)  
 799  
 Guillou (AA)  
 784  
 Guinard (J-X)  
 891  
 Guterrez (MD)  
 894  
 Hagi (Y)  
 791  
 Haider (H-J)  
 905  
 Hale (DS)  
 851  
 Hamada (JS)  
 942  
 Hang (YD)  
 732  
 Hanna (MA)  
 801  
 Hansen (PMT)

758  
 Harata (A)  
 858  
 Hardin (RT)  
 867  
 Hardy (JK)  
 895  
 Harris (LJ)  
 727  
 Haftel (RW)  
 832  
 Harvey (RA)  
 889  
 Hassona (HZ)  
 811  
 Hattula (MT)  
 857  
 Hegazy (NA)  
 811  
 Heid (MK)  
 945  
 Heikes (DL)  
 806  
 Hereijers (W)  
 842  
 Hernandez (PE)  
 855  
 Heymann (H)  
 874  
 Hickey (MW)  
 859  
 Hirota (T)  
 816  
 Holden (J)  
 785  
 Holm (ET)  
 854  
 Holscher (W)  
 896  
 Honikel (KO)  
 847  
 Hoopman (T)  
 795  
 Hoschke (A)  
 929  
 Hoz (L)  
 841  
 Hsieh (F)  
 846  
 Hubinger (M)  
 788  
 Huffman (DL)  
 844  
 Huhtanen (CN)  
 798

Husain (S)  
 913  
 Hutkins (RW)  
 830  
 Iametti (S)  
 826  
 Ike (M)  
 924  
 Ishiyama (T)  
 743  
 Iwamoto (H)  
 924  
 Iwao (R)  
 812  
 Jackson (DS)  
 746  
 Jain (PP)  
 756  
 Jaiswal (PK)  
 833 908  
 Jaleel (SA)  
 775  
 Janas (P)  
 781 782  
 Jans (JA)  
 821  
 Jayachandra (K)  
 919  
 Jeon (IJ)  
 819  
 Jeremiah (LE)  
 848  
 Jitendra Kumar  
 870  
 Jolan de Groot  
 755  
 Jones (SDM)  
 848  
 Jones (SH)  
 855  
 Jones (WR)  
 844  
 Juliano (BO)  
 744  
 Kaizu (H)  
 816  
 Kajimoto (G)  
 917  
 Kanchana (S)  
 767  
 Kapoor (R)  
 734  
 Karayalar (KS)  
 815

Kastner (C)  
843  
Katiyar (SK)  
823  
Kato (T)  
858  
Katusin-Razem (B)  
873  
Kaushik (V)  
754  
Kelch (WJ)  
926  
Keller (SE)  
838  
Kempthorne (R)  
895  
Khachik (F)  
785  
Khan (WU)  
738  
Kiely (LJ)  
831  
Kim (CH)  
747  
Kim Ha (J)  
825  
Kindstedt (PS)  
831  
King (JM)  
880  
Kinsella (JE)  
906  
Klaenhammer (TR)  
727  
Knowles (M)  
704  
Koga (Y)  
924  
Kohlmann (KL)  
726  
Korane (UN)  
869  
Korolev (AM)  
721  
Kress-Rogers (E)  
717  
Krishnamurthy (A)  
940  
Krishnamurthy (MM)  
938  
Krishnamurthy (TS)  
937  
Kudchadker (AP)  
710  
Kulkarni (AR)

928  
Kulkarni (PR)  
731  
Kumaraswamy (K)  
804  
Labib (SM)  
946  
Ladisch (MR)  
726  
Lafosse (M)  
762  
Lai (M-N)  
748  
Lajolo (FM)  
769  
Lakshminarayana (G)  
940  
Lala (AK)  
710  
Lalor (EF)  
892  
Lamb (J)  
792  
Lambelet (P)  
724  
Lambert (AD)  
853  
Langstaff (SA)  
891  
Larick (DK)  
845  
Larson (EM)  
854  
Laurent (M)  
711  
Lavery (SA)  
888  
Lawless (HT)  
739  
Lee (CM)  
888  
Lee (H)  
728 923  
Lee (HG)  
888  
Lee (HY)  
900  
Lee (KH)  
867  
Lee (TA)  
895  
Lerici (CR)  
897  
Levri (EA)  
926

Lewis (GJ)  
850  
Lewis (MJ)  
891  
Lindsay (RC)  
825  
Loliger (J)  
724  
Lonsane (BK)  
775  
Lorient (D)  
875  
Losada (PP)  
720  
Love (J)  
768  
Lozano (JS)  
720  
Lucia (LM)  
851  
Lusby (WR)  
785  
Luther (G)  
809  
Lutz (S)  
848  
Lyon (CE)  
864  
Macku (C)  
719  
Macleod (JA)  
763  
Maga (JA)  
747  
Mahia (PL)  
720  
Malik (RK)  
827 828 829  
Manjula (K)  
940  
Manullang (M)  
758  
Marchello (MJ)  
854  
Marin (AB)  
934  
Marshall (DL)  
866  
Marshall (WE)  
770  
Marth (EH)  
736  
Martin (R)  
855



Martinez-Castro (I)  
 817  
 Maruri (JL)  
 846  
 Mascaros (AF)  
 807  
 Mathlouthi (M)  
 795  
 Mathur (DK)  
 827 828 829  
 Mathur (KC)  
 756  
 Matringe (E)  
 875  
 Mattheis (JP)  
 793  
 Mattila-Sandholm (T)  
 842  
 Mau (J-L)  
 729  
 Mauri (LM)  
 941  
 Mazumdar (BC)  
 787  
 McBee (LE)  
 874  
 McDaniel (MR)  
 932  
 McEvily (AJ)  
 880  
 McIntyre (S)  
 713  
 McNiven (MA)  
 763  
 Mckay (LL)  
 947  
 Mehta (U)  
 734  
 Mekawy (AA)  
 811  
 Memegalli (FC)  
 788  
 Mendoza (S)  
 786  
 Merritt (JH)  
 879  
 Meunier (J-C)  
 839  
 Mihaljevic (B)  
 873  
 Mishra (R)  
 877  
 Misra (AN)  
 708  
 Misra (G)

903  
 Miyamoto (A)  
 773 774  
 Miyamoto (T)  
 812  
 Mo (O)  
 843  
 Molina (I)  
 861  
 Mondy (NL)  
 778  
 Montani (ML)  
 764  
 Moran (MJ)  
 894  
 Moreno (J)  
 894  
 Morgan (JB)  
 851  
 Morgan (M)  
 728  
 Morita (S)  
 884  
 Morris (JR)  
 893  
 Muego-Gnanasekharan (KF)  
 761  
 Munshi (CB)  
 778  
 Muralidharan (N)  
 937  
 Nagin Chand  
 931  
 Naito (S)  
 703  
 Nakahara (K)  
 791  
 Nakajima (H)  
 816  
 Nalini Ayya  
 739  
 Namasivayam (C)  
 814  
 Narasimhan (KS)  
 937  
 Nasir Ahmed (S)  
 804  
 Nawa (Y)  
 783  
 Ndi (EF)  
 868  
 Neekakantan (S)  
 767  
 Negri (E)

Nelsen (TC)  
 765  
 Nelson (AI)  
 766  
 Nicoli (MC)  
 897  
 Nielsen (SS)  
 726  
 Nieuwenhuijse (JA)  
 820  
 Nigam (SK)  
 903  
 Nikkuni (S)  
 743  
 Nirankar Nath  
 754  
 Nishina (PM)  
 944  
 Njoku (HO)  
 750  
 Nochera (C)  
 805  
 Noda (T)  
 783  
 Nunes da Ponte (M)  
 914  
 Oderiz (LV)  
 720  
 Ofuya (CO)  
 750  
 Ogabulie (JN)  
 750  
 Ogbonna (DN)  
 759  
 Oh-Hashi (A)  
 871  
 Ohno (S)  
 922  
 Ohtani (T)  
 783  
 Okayama (T)  
 860  
 Olano (A)  
 817  
 Orchard (JE)  
 901  
 Ordonez (JA)  
 841  
 Orinrod (IHL)  
 892  
 Osajima (Y)  
 902  
 Owuor (PO)  
 901

Padmakar  
 796  
 Palaniappan (S)  
 716  
 Pandey (NK)  
 863  
 Papa (CM)  
 864  
 Paramasivam (P)  
 771  
 Park (YH)  
 923  
 Park (YW)  
 890  
 Patel (AA)  
 836  
 Patel (JR)  
 818  
 Pathak (PK)  
 918  
 Patil (GR)  
 836  
 Patil (MN)  
 833 908  
 Patrascu (L)  
 926  
 Pattee (HE)  
 760  
 Patterson (RLS)  
 855  
 Paul (SM)  
 930  
 Peerson (JM)  
 945  
 Penman (A)  
 705  
 Petronio (M)  
 810  
 Philipsen (DH)  
 898  
 Phillips (RD)  
 752  
 Pieper (G)  
 899  
 Pinthus (EJ)  
 779  
 Pinto (VEF)  
 764  
 Pomeranz (Y)  
 799  
 Prasad (RBN)  
 940  
 Prasai (RK)  
 851  
 Preobrazhenskaya (MN)

721  
 Price (JF)  
 852  
 Purslow (PP)  
 850  
 Quagliuolo (L)  
 790  
 Quinsac (A)  
 762  
 Radha Iyengar  
 880  
 Rahman (I)  
 912  
 Rajalakshmi (D)  
 931  
 Rajasri (M)  
 938  
 Rajendra Kumar (K)  
 740  
 Rajorhia (GS)  
 836  
 Ram Gopal  
 863  
 Rama Prasad (C)  
 834  
 Ramesh (GS)  
 754  
 Ranganathan (K)  
 814  
 Rasyid (F)  
 758  
 Raut (SD)  
 908  
 Ravinder Reddy (S)  
 862  
 Razem (D)  
 873  
 Reddy (GPV)  
 938  
 Reddy (HRV)  
 881  
 Regenstein (JM)  
 883 886  
 Rehman (IA)  
 911  
 Reid (RA)  
 887  
 Reineccius (GA)  
 718  
 Renshaw (J)  
 706  
 Renuad (T)  
 711  
 Ressurrecion (AVA)  
 761

Ribaillier (D)  
 762  
 Rice (AE)  
 850  
 Rillo (L)  
 790  
 Rittner (H)  
 910  
 Rizzolo (A)  
 757  
 Robe (GH)  
 840  
 Robertson (WM)  
 848  
 Rodriguez-Yunta (MA)  
 841  
 Roller (S)  
 723  
 Roozen (JP)  
 755  
 Sadekar (RD)  
 869  
 Saguy (IS)  
 779  
 Sahee (BC)  
 741  
 Saito (M)  
 871  
 Salih (AM)  
 852  
 Salil Seghal  
 753  
 Sandik (K)  
 846  
 Sandoval (AJ)  
 786  
 Sanjay Jain  
 710  
 Sannabhadti (SS)  
 818  
 Sanni (AI)  
 759  
 Sarag (AN)  
 869  
 Saraswat (VK)  
 742  
 Sareen (S)  
 735  
 Sarlo (S)  
 757  
 Sarma (SC)  
 715  
 Sasaki (K)  
 884



Sastry (SK)	770	Soni (PL)
716	Shiina (T)	737
Sato (Y)	783	Sreekumari (KR)
858	Shimamoto (T)	930
Saucy (F)	791	Srikanta (S)
724	Shimoda (M)	775
Savell (JW)	902	Srinivasan (RA)
851	Shiva (MP)	835
Schaefer (MJ)	737	Steenson (LR)
768	Shoji (A)	726
Schirle-Keller (J-P)	791	Steinhart (H)
718	Shomer (I)	896
Schneeman (BO)	777	Stratton (JE)
944	Shukla (SK)	830
Schulze (J)	708	Suarez (C)
802	Sim (JS)	788
Scott (EP)	867	Subramanian (P)
712	Simizu (K)	827 828 829
Seetharaman (K)	858	Subramanian (R)
778	Singh (BPN)	834
Seiler (W)	918	Surana (A)
813	Singh (C)	738
Senesi (E)	925	Suri (RK)
757	Singh (RP)	756
Sensidoni (A)	870	Suvendu Bhattacharya
897	Singh (T)	885
Serghat (S)	751	Suzuki (C)
795	Singleton (JA)	743
Servillo (L)	760	Suzuki (Y)
790	Sirothia (AR)	816
Sessa (DJ)	869	Swinton (S)
765	Siscar-Lee (JJH)	723
Seuss (I)	744	Tamilarasi (P)
847	Sitohy (MZ)	939
Severini (C)	946	Tamilmani (V)
897	Sivadasan (CR)	882
Shafiur Rahman (Md)	930	Tatsumi (M)
792	Sjollema (A)	917
Shantaram (MV)	820	Taylor (SL)
794	Skytta (E)	830
Shanthi Narasimhan	842	Tenorio (MD)
931	Slanger (WD)	785
Sharma (S)	854	Theuer (RC)
737	Smith (DM)	889
Sharma (SR)	865	Thomas (EK)
803	Smith (JP)	815
Sharpe (FR)	853	Thomas (PP)
892	Smith (KW)	915 916 921
Shepherd (R)	797	Thompson (DB)
935	Smith (LB)	729
Shibamoto (T)	824	Tiwari (KN)
719	Sogo (N)	751
Shigematsu (H)	812	Toldra (F)
902	Song (J)	861
Shih (FF)	943	

Tomio (JM)  
 941  
 Tong (AKW)  
 848  
 Traore (F)  
 839  
 Troyano (E)  
 817  
 Tsai (WYJ)  
 878  
 Tsuji (S)  
 744  
 Tuan (Y-H)  
 752  
 Udayasoorian (C)  
 771 772 882  
 Ulberth (F)  
 905  
 Uma Mageshwari (S)  
 939  
 Umano (K)  
 791  
 Unklesay (K)  
 846  
 Unklesbay (K)  
 856  
 Unklesbay (N)  
 846 856  
 Vaamonde (G)  
 764  
 van Boekel (MAJS)  
 820  
 van Mill (PJJM)  
 821  
 van Vliet (T)  
 820  
 Vasconcelos (AMP)  
 914  
 Vasishtha (AK)  
 925  
 Vedanayagam (HS)  
 920  
 Venugopal (G)  
 930  
 Verghese (J)

927  
 Vijay Kumar  
 776  
 Vitzthum (OG)  
 896  
 Voldeng (H)  
 763  
 Wada (T)  
 922  
 Wallin (HC)  
 857  
 Walstra (P)  
 820  
 Wang (Y)  
 909  
 Wander (RC)  
 943  
 Wang (H-H)  
 748  
 Wardale (RJ)  
 855  
 Wei (LS)  
 766  
 Weinberg (P)  
 779  
 Weipert (D)  
 808  
 Wells (JH)  
 866  
 Wen (MC)  
 906  
 Wharf (SG)  
 935  
 Wiese-Lehigh (PL)  
 866  
 Wille (G)  
 709  
 Williams (KC)  
 872  
 Wilson (RL)  
 864  
 Wolf (CL)  
 747  
 Woodams (EE)  
 732

Workman (DS)  
 893  
 Wu (S-D)  
 725  
 Wyatt (G)  
 728  
 Xiong (YL)  
 840  
 Yadav (JS)  
 835  
 Yamaguchi (M)  
 871  
 Yamamoto (Y)  
 812  
 Yamanoue (M)  
 860  
 Yamashita (N)  
 766  
 Yano (T)  
 936  
 Yau (NJJN)  
 932  
 Yoshida (A)  
 884  
 Yoshida (H)  
 917  
 Yoshitake (K)  
 902  
 Young (LL)  
 864  
 Zakiuddin Ali (S)  
 740  
 Zaroni (B)  
 810  
 Zhang (W)  
 746  
 Zottola (EA)  
 824  
 Zunft (H-J)  
 802  
 Zutshi (K)  
 776  
 Zwingelberg (H)  
 745



# SUBJECT INDEX

## Acceptability

- food irradiation legislation & consumer acceptability 948
- fruit punch flavoured beverages, colour & acceptability of 898

## Additives

- fish muscles, additives & volatile acids from 884
- Indian standards for food additives 735

## Adulteration

- ghee, palmolein detection in 833
- groundnut oils, castor oil adulteration detection in 913
- groundnut oils/sesame oils, water melon seed oil adulteration detection in 908
- oils, adulteration detection in vegetable 907

## Aflatoxins

- soybeans, a w//temp./incubation time & aflatoxin B<sub>1</sub> in 764

## Allinase

- garlic 927

## Almonds

- packaging conditions & stability of peeled almonds 757

## Alveograph

- dough, alveograph measurement of 808

## Amino acids

- N-alkylpyrroles formation in amino acids 719
- bread dough fermentation, yeasts & amino acid metabolism during 807
- deoiled meals, amino acid composition of 756

## Amitraz

- chillies, phosalone pest control in 938

## Amylases

- starch, amylases & degradation of enzyme-resistant 799
- sweet potato starch, *Chalara paradoxa* glucoamylase & hydrolysis of 783

## Antibacterial properties

- Pediococcus* antibacterial activity in minced meat 842

## Antioxidant properties

- cookies, egg yolk antioxidant activity during baking/storage of 812
- food systems, coenzyme Q<sub>10</sub> antioxidant properties in 724

- orange juices, browning reaction products antioxidative activity of storage-aged 900

## Apricots

- baby foods, K as index in apricot based 889

## Aroma compounds

- orange juices, aroma volatiles absorption by laminated carton package & sensory quality of 899

## Ascorbic acid

- mackerels, ascorbic acid & Fe content of 886

## Ascorbigen

- HPLC of ascorbigen 721

## Aspartames

- fruit preparation, sundae style yoghurt fermentation & aspartame stability in 838

## Autoclaving

- faba beans, autoclaving & protein/starch digestibility of 753

## Baby foods

- K as index in fruit based baby foods 889

## Bacillus coagulans

- tomato pastes, *B. coagulans* thermal resistance in conc. 786

## Bacillus subtilis

- honeys, *B. subtilis* spores gamma-radiation resistance in 798

## Baking

- cookies, egg yolk antioxidant activity during baking of 812
- dough characteristics & baking machines 809

## Bananas

- baby foods, K as index in banana based 889

## Beef

- blends, thermophysical properties of extruded beef/corn flour 846
- broth, cooking temp. & flavour compounds of beef 847
- carcasses, processing lactic acid microbiological effect on beef 851
- cooked beef, conditioning & perimusial connective tissue strength in 850
- diet & volatile concn./flavour of beef 845
- distribution & microbial quality/oxidation in low-fat ground beef 844
- mixtures, chicken meat detection

- ELISA in beef-pork 855

- roasts, cooking/reheating & properties of beef 849
- steaks, marbling level/electrical stimulation postmortem aging & cooking/palatability properties of beef rib-eye 848

## Beer

- mouthfeel instrumental evaluation of beer 891
- yeast proteolytic enzymes release into beer 892

## Benzotriazole

- steel, benzotriazole & corrosion inhibition of mild 708

## Beverages

- fruit punch flavoured beverages, colour & thirst quenching/sweetness/acceptability/flavour intensity in 898

## Bioavailability

- food folates, bioavailability of 945
- Spirulina platensis*/eggs/wheat, Fe bioavailability from 734

## Biochemical changes

- Oryza sativa* grain, biochemical changes during maturation/development of 741

## Bioconversions

- microorganisms & bioconversions, review 702

## Biosensors

- food industries & biosensors 717

## Bisphenol

- detn. LC of bisphenol 720

## Black pepper

- moisture content of black pepper 930
- Piper nigrum* powder, GC analysis/sensory profiles of stored 931

## Blackgram

- Vigna mungo*, S & composition of 749

## Blanching

- French beans, peroxidases & blanching of 754

## Bread

- dough fermentation, microorganisms & amino acid metabolism during bread 807
- moisture/temp. & specific heat of bread 810

## Breadfruits

- composite flour products,

- nutritional evaluation of breadfruit-containing 805
- Brewing**
  - coffee, brewing time & compositional changes in brewed 895
- Broccoli**
  - carotenoids food preparation effect in broccoli 785
- Broilers**
  - carcass characteristics/meat yield/quality of synthetic dam line broilers 863
  - meats, diets & fat composition of broiler 867
- Browning**
  - orange juices, browning reaction products antioxidative activity of storage-aged 900
- Buffalo milk**
  - Cheddar cheese, nitrogen fractions in buffalo milk based 827
  - Cheddar cheese, peptides of buffalo milk based 829
  - Cheddar cheese, protein PAGE of buffalo milk based 828
- Cakes**
  - low-calorie cakes, groundnut hull flour & properties of 811
- Calcium chloride**
  - cucumber,  $\text{CaCl}_2$  &  $\text{NaCl}$  reduction during fermentation/storage of 784
- Cans**
  - corrosion microscopic/X-ray microanalysis of welded food cans 707
- Capsicum annum**
  - see Chillies
- Carbohydrates**
  - solute-solvent interactions & sweet taste of carbohydrates 795
- Carbon dioxide**
  - food grains,  $\text{CO}_2$  monitoring method for controlled atm. stored 937
  - soybean sludge,  $\text{CO}_2$  supercritical & tocopherol concn. from 923
  - UF systems,  $\text{CO}_2$  corrosivity as sanitizer in 733
- Carbonation**
  - sweetness/sourness, carbonation interaction with 932
- Carbons**
  - soybean oils, activated carbons & peroxide/TBA/carbonyl values of autoxidized 922
- Carbonyl values**
- soybean oils, activated carbons & carbonyl values of autoxidized 922
- Carboxymethyl guar gum**
  - viscosity of carboxymethyl guar gum 738
- Carcasses**
  - broilers, carcass characteristics of synthetic dam line 863
  - ovine carcasses, post-exsanguination infusion & tenderness indicators/muscle microstructure of 852
- Carotenoids**
  - vegetables, carotenoids food preparation effect in green 785
- Cartons**
  - orange juices, aroma volatiles absorption by laminated carton package & sensory quality of 899
- Caseins**
  - cross-linking activity of placental 839
- Cassava**
  - pulpy substrate fermented in solid phase, ethanol recovery technique from 775
- Cassia fistula**
  - biochemical role/hypocholesterolemic potential of Cassia fistula 946
- Castor oils**
  - groundnut oils, castor oil adulteration detection in 913
- Cellulose**
  - glucose, cellulosic materials enzymatic hydrolysis & production of 796
- Chalara paradoxa**
  - sweet potato starch, Chalara paradoxa glucoamylase & hydrolysis of 783
- Cheddar cheese**
  - histamine production in low-salt Cheddar cheese 830
  - nitrogen fractions in buffalo milk based Cheddar cheese 827
  - peptides of buffalo milk based Cheddar cheese 829
  - protein PAGE of buffalo milk based Cheddar cheese 828
- Cheese**
  - fatty acids/phenolic compounds & flavour of cheese 825
  - pathogens in cheese 824
  - protein hydrophobicity spectrofluorimetric estimation in ripening cheese 826
- Chemical properties**
  - beef roasts, cooling/reheating & chemical properties of 849
- coffee beans, roasting & chemical changes in 897
- groundnut pastes, temp. & chemical properties of 761
- milk powder, heat treatment/storage & chemical properties of 822
- pork, chemical properties of MAP/irradiated fresh 853
- soy proteins, physicochemical properties of isolated 769
- Chhurpi**
  - soy-yak milk cheese like product 823
- Chickens**
  - beef-pork mixtures, chicken meat detection ELISA in 855
  - egg production/egg wt. in chickens 870
  - extruder die temp. & texture/microstructure of restructured mechanically deboned chicken 865
  - meat, sodium tripolyphosphate/ionic strength/pH & moisture retention/textural properties of chicken 864
  - nuggets, *Listeria monocytogenes*/*Pseudomonas fluorescens* growth on stored precooked chicken 866
- Chickpeas**
  - Cicer arietinum*, Zn application & nutrient content in 751
- Chillies**
  - Capsicum annum*, insecticides pest control in 938
- Cholesterol**
  - broiler meats, diets & cholesterol & cholesterol composition of 867
  - fermented milk, cholesterol lowering activity of 816
- Cholesterol oxides**
  - ghee, cholesterol oxides in commercial home-made Indian 834
- Cicer arietinum**
  - see Chickpeas
- Cider**
  - technological method analytical control of cider production 894
- Citric acid**
  - wine coolers, citric acid & storage stability of 893
- Clam**
  - powder, *Staph. aureus* growth/enterotoxin production in clam 878



- Cloning**  
pFMO11 as possible food-grade cloning vector 947
- Clostridium**  
bioconversions & Clostridium, review 702
- Clostridium botulinum**  
honeys, Cl. botulinum spores gamma-radiation resistance in 798
- Cocoa beans**  
Theobroma cacao, seasons/drying temp. & quality of 794  
Theobroma cacao cell cultures, culture conditions & fatty acid composition of 906
- Coconut oils**  
diacylglycerols/fatty acids/phospholipids & crystallization of coconut oils 912  
processing & composition/oxidative stability of coconut oils 911
- Coconuts**  
protein, isolation/characterization of coconut 758
- Cod**  
processing/frozen storage & Fe content of cod 883
- Coenzyme Q<sub>10</sub>**  
food systems, coenzyme Q<sub>10</sub> antioxidant properties in 724
- Coffee**  
brewing time & compositional changes in brewed coffee 895  
roasted coffee, prenyl alcohol-odorants in 896
- Coffee beans**  
roasting & physicochemical changes in coffee beans 897
- Coliforms**  
fecal coliform enumeration, agar medium for 725
- Colour**  
fruit punch flavoured beverages, colour & thirst quenching/sweetness/acceptability/flavour intensity in 898  
paprika powders, colour substances stability in 929
- Composite flour**  
products, nutritional evaluation of breadfruit-containing composite flour 805
- Consumers**  
Flair-Flow Europe & consumers 701  
food irradiation & consumer acceptability 948
- tastes, consumer preference & measurement of food 933
- Contamination**  
poultry, pesticide contaminated feed effect on 862
- Convection**  
foods, convection ovens & drying rates of 713
- Cookies**  
egg yolk antioxidant activity during baking/storage of cookies 812
- Cooking**  
beef broth, cooking temp. & flavour compounds of 847  
beef rib-eye steaks, marbling/electrical stimulation/postmortem aging & cooking of 848  
meat products, cooking temp. & colour formation/nitrite decomposition/sarcoplasmic protein denaturation in processed 860  
pork leg roasts, cooking temp. & properties of fresh 854
- Copper**  
egg whites, Cu & properties of spray-dried heat-treated 874
- Corn**  
grits, gellan gum & extrusion of corn 747
- Corn flour**  
beef/corn flour blends, thermophysical properties of extruded 846
- Corn oils**  
N-alkylpyrroles formation in corn oils 719
- Corn starch**  
extruder die temp. & texture/microstructure of corn starch 865
- Corrosion**  
cans, corrosion microscopic/X-ray microanalysis of welded food 707  
steel, benzotriazole & corrosion inhibition of mild 708
- Cosmos**  
fat/protein source 903
- Cottonseeds**  
owoh-fermented seasoning agent from cottonseed 759
- Cowpeas**  
nutritional quality of hard-to-cook/processed cowpeas 752  
Vigna sinensis, S & composition of 749
- Cryosectioning**  
microbial growth detection by cryosectioning 722
- Crystallization**  
coconut oils, minor components & crystallization of 912  
triglycerides, crystallization DSC measurement in 797
- Cucumber**  
CaCl<sub>2</sub>/potassium sorbate & NaCl reduction during fermentation/storage of cucumber 784
- Cysteine sulfoxides**  
garlic 927
- Dahlia**  
fat/protein source 903
- Dairy**  
wastes, red mud & treatment of dairy 814
- Deacidification**  
olive oils, deacidification supercritical fluid extraction of 914
- Deamidation**  
proteins/protein hydrolysates, peptidoglutaminase deamidation of 942
- Degradation**  
starch, amylases & degradation of enzyme-resistant 799
- Dehydrated foods**  
fruit pulps, heating of dehydrated 789  
garlic 927  
pinapples, drying-air behaviour of fresh/osmotically dehydrated 792
- Desserts**  
ice crystal size distributions in frozen desserts 832
- Diabetics**  
dietary Na intake in diabetics 939
- Diacylglycerols**  
coconut oils, diacylglycerols & crystallization of 912
- Diet**  
beef, diet & volatile concn./flavour of 845
- Dietary fibers**  
plasma lipoprotein/apolipoprotein in rats, dietary fibers effect on 944
- Differential scanning calorimetry**  
triglycerides, crystallization/melting DSC measurement in 797
- Digestibility**  
faba beans, processing/cooking & starch digestibility of 753

**Dispersion**  
mathematical evaluation of food  
dispersions 714

**Dough**  
baking machines & dough  
characteristics 809  
bread dough fermentation,  
microorganisms & amino acid  
metabolism during 807  
extensograph/alveograph  
measurement of dough 808

**Dried foods**  
egg whites, metallic cations &  
properties of spray-dried  
heat-treated 874

**Drumstick**  
see *Moringa oleifera*

**Drying**  
cocoa beans, drying temp. &  
quality of 794  
oven & drying rates of foods 713  
pineapples, drying-air behaviour  
of fresh/osmotically dehydrated  
792  
rapeseed oils, drying temp. &  
quality of 918

**Duck**  
proteins, pH & thermal  
aggregation properties of duck  
salt soluble 868

**ELISA**  
beef-pork mixtures, chicken meat  
detection ELISA in 855

**Economics**  
milk production, economics of 815

**Egg**  
traits, prosomillet & egg quality  
869

**Egg albumin**  
Haugh unit score & egg albumin  
quality 872

**Egg powders**  
chemical changes radiation  
induced in whole egg powders 873

**Egg proteins**  
rat liver microsomal  
mixed-function oxidases &  
dietary egg proteins 871

**Egg whites**  
spray-dried heat-treated egg  
whites, metallic cations &  
properties of 874

**Egg yolks**  
cookies, egg yolk antioxidant  
activity during baking/storage  
of 812  
granules, mineral cations &  
microstructure of egg yolk 875  
prosomillet & pigmentation of egg  
yolk 869

**Eggs**  
chickens, egg production/egg wt.  
in 870  
iron bioavailability from eggs 734

**Electrical conductivity**  
solid foods, ohmic heating &  
electrical conductivities of 716

**Electrical stimulation**  
beef rib-eye steaks, electrical  
stimulation &  
cooking/palatability properties  
of 848

**Electrolytes**  
thiamine, electrolytes & loss of  
941

**Enterotoxins**  
sausages, smoking & enterotoxin  
production in fermented 858

**Enzymes**  
bioconversions & enzymes, review  
702  
food industries & enzymes 723  
soups/sausages, glutamic acid  
detn. enzymatic in 857  
soy protein isolates,  
phosphorylation-enzymatic  
functional properties of 770

**Equipments**  
baking machines & dough  
characteristics 809

**Escherichia coli**  
black pepper, *E. coli* in 930

**Esterification**  
lipase esterification & plastic  
fats from saturated acid rich  
fats 904  
oils, phospholipids effect on  
enzyme-catalyzed  
transesterification of 909

**Ethyl alcohol**  
oils, extraction ethyl alcohol of  
vegetable 910  
pulpy substrate fermented in  
solid phase, ethanol recovery  
technique from 775

**Extensograph**  
dough, extensograph measurement  
of 808

**Extraction**  
oils, extraction ethyl alcohol of  
vegetable 910  
olive oils, deacidification  
supercritical fluid extraction  
of 914  
palm oil extraction, dry process  
for 915  
pectin, extraction of sunflower  
head 774  
UHT processed milk, volatile  
flavour compounds solid phase

extraction from 819

**Extruded foods**  
beef/corn flour blends,  
thermophysical properties of  
extruded 846

**Extruder**  
chicken/corn starch, extruder die  
temp. & texture/microstructure  
of restructured mechanically  
deboned 865

**Extrusion**  
corn grits, gellan gum &  
extrusion of 747  
fish/wheat flour blends,  
extrusion & rheological  
properties of minced 885  
vinyl polymers,  
extrusion-grafting starch onto  
801

**Faba beans**  
processing/cooking &  
protein/starch digestibility of  
faba beans 753

**Fats**  
ornamental plants source of fats  
903  
plastic fats from saturated acid  
rich fats 904  
trans unsaturation low level  
detn. spectroscopy in fats 905

**Fats animal**  
beef, distribution & microbial  
quality/oxidation of low-fat  
ground 844

**Fatty acids**  
broiler meats, diets & fatty  
acid composition of 867  
cheeses, fatty acids & flavour of  
825

coconut oils, free fatty acids &  
crystallization of 912  
palm oils, microwave heating &  
fatty acid production in 917  
rice bran, fatty acids estimation  
in 920

*Theobroma cacao* cell cultures,  
culture conditions & fatty acid  
composition of 906

**Fenvadevate**  
chillies, fenvadevate pest  
control in 938

**Fermentation**  
bread dough fermentation,  
microorganisms & amino acid  
metabolism during 807  
cucumber,  $\text{CaCl}_2$ /potassium  
sorbate &  $\text{NaCl}$  reduction during  
fermentation/storage of 784  
fruit preparation, sundae style  
yoghurt fermentation & aspartame



stability in 838

miso, rice protein changes during fermentation of 743

sorghum mash, fermentation pseudo-steady heat conduction model of 748

## **Fermented foods**

*Lactobacillus/coliforms*, fermented milk effect on faecal 818

sausages, smoking & staphylococcal growth/enterotoxin production in fermented 858

## **Fermented milk**

cholesterol lowering activity of fermented milk 816

## **Fish**

blends, extrusion & rheological properties of minced fish/wheat flour 885

muscles, spices/seasonings/additives & volatile acids from fish 884

poultry waste recycling in integrated fish farming 882

## **Fish oils**

arachidonic acid metabolism/hemostatic function in rats, fish oil effect on 943

## **Flavour**

beef, diet & flavour of 845  
fruit punch flavoured beverages, colour & flavour intensity in 898  
garlic 927

ghee flavour research, advances in 835

pork leg roasts, cooking temp. & flavour of fresh 854

pork, flavour in MAP/irradiated fresh 853

## **Flavour compounds**

beef broth, cooking temp. & flavour compounds of 847  
proteins microparticulated & interaction of flavour compounds 718

UHT processed milk, volatile flavour compounds solid phase extraction from 819

## **Flour**

food items, chlorinated bleaching adducts GC-MS detn. in flour-containing 806

## **Folates**

bioavailability of food folates 945

## **Freezing**

groundnuts, maturity & freeze damage in stored 760

## **French beans**

*Phaseolus vulgaris*, peroxidases & blanching of French bean 754

## **Fried foods**

soybean oil rancidity & quality of fried foods 924

## **Frozen foods**

desserts, ice crystal size distribution in frozen 832  
heat transfer coeff. in stored frozen foods 712  
scallop meat, quality losses in frozen 879  
thermal properties of frozen foods 711

## **Fruit juices**

wine coolers, juice content & storage stability of 893

## **Fruit punch**

beverages, colour & thirst quenching/sweetness/acceptability/flavour intensity in fruit punch flavoured 898

## **Fruits**

pulps, heat of dehydrated fruit 789

## **Frying**

potato products, frying deep-fat & oil uptake in restructured 779

## **Galactose**

milk, heating & galactose formation in 817

## **Garlic**

husk, pectin content of garlic 787

## **Gas chromatography**

black pepper powder, GC analysis of stored 931

## **Gel**

surimi, sodium ascorbate & gel-forming properties of 888

## **Gelatinization**

potato starch, gelatinization & rheological properties of 782

## **Gelation**

sunflower head pectin, gelling characteristics of 773

## **Gellan gum**

corn grits, gellan gum & extrusion of 747

## **Ghee**

cholesterol oxides in commercial/home-made Indian ghee 834  
flavour research, advances in ghee 835  
palmolein detection in ghee 833

## **Glucose**

cellulosic materials enzymatic hydrolysis & production of glucose 796

## **Glucosinolates**

rapeseed glucosinolates, detn. LC of 762

## **Glutamic acid**

sausages, glutamic acid detn. enzymatic in minced 857  
soups, glutamic acid detn. enzymatic in dried 857

## **Glycine max**

see Soybeans

## **Grains**

food grains, CO<sub>2</sub> monitoring method for controlled atm. stored 937

## **Green beans**

carotenoids food preparation effect in green beans 785

## **Greengram**

*Vigna radiatus*, S & composition of 749

## **Groundnut oils**

castor oil adulteration detection in groundnut oils 913  
palmolein adulteration detection in groundnut oils 907  
water melon seed oil detection in groundnut oils 908

## **Groundnuts**

cakes, groundnut hull flour & properties of low-calorie 811  
maturity & freeze damage in stored groundnuts 760  
pastes, temp. & properties of groundnut 761

## **Guar gum**

viscosity of carboxymethyl/hydroxypropyl guar gum 738

## **Guavas**

water vapour adsorption isotherms of guava 788

## **Gum**

*Leucaena leucocephala*-gum 737

## **Gums**

rice bran oil gums, lecithin/powder phosphatides from 919

## **HPLC**

ascorbigen, HPLC of 721

## **Ham**

dry-cured ham, microorganisms proteolytic activity detection in 861

## **Heat**

bread, moisture/temp. & specific heat of 810  
egg whites, metallic cations & properties of spray-dried heat-treated 874  
fruit pulps, heat of dehydrated

- 789  
milk powder, heat treatment & properties of 822  
skim milk, heat stability of conc. 820
- Heat exchangers**  
thin film scraped surface heat exchangers 715
- Heat transfer**  
frozen foods, heat transfer coeff. in stored 712  
pork/soy products, heat transfer coeff. for 856
- Heating**  
beef roasts, reheating & properties of 849  
milk, heating & galactose/tagatose formation in 817  
solid foods, ohmic heating & electrical conductivities of 716
- Hexylresorcinol**  
shrimps, 4-hexylresorcinol detn. LC in 880
- Histamines**  
Cheddar cheese, histamine production in low-salt 830
- Hollyhack**  
fat-protein source 903
- Honeys**  
*Clostridium botulinum*/Bacillus subtilis spores gamma-radiation resistance in honeys 798
- Hydrochloric acid**  
soybean lipooxygenases, HCl soaking & activity of 766
- Hydrolysates**  
protein hydrolysates, peptidoglutaminase deamidation of 942
- Hydrolysis**  
anaerobic digestion, modelling of hydrolysis controlled 710  
glucose, cellulosic materials enzymatic hydrolysis & production of 796  
sweet potato starch, *Chalara paradoxa* glucoamylase & hydrolysis of 783
- Hydrophobicity**  
cheese, protein hydrophobicity spectrofluorimetric estimation in ripening 826
- Hydroxy propyl guar gum**  
viscosity of hydroxypropyl guar gum 738
- Hypertensives**  
dietary Na intake in hypertensives 939
- Hypocholesterolemic activity**  
*Cassia fistula*, hypocholesterolemic potential of 946
- Industries**  
enzymes & food industries 723  
Flair-Flow Europe & food industries 701  
food industry & biosensors 717  
processing industries-food, review 702  
seafood processing industries, Orissa 877
- Infant foods**  
buffering capacity of goat milk/cow milk/soy-based infant formulas 890
- Iron**  
cod/ mackerels, processing/frozen storage & Fe content of 883  
mackerels, packaging-vacuum/ascorbic acid/frozen storage & Fe content of 886  
*Spirulina platensis*/eggs/wheat, Fe bioavailability from 734
- Irradiated foods**  
egg powders, chemical changes radiation induced in whole 873
- Irradiation**  
food irradiation legislation & consumer acceptability 948  
pork, physicochemical changes in MAP/irradiated fresh 853  
potatoes, irradiation & nitrate-nitrogen concn. of 778  
potatoes, starch properties of irradiated/stored 780
- Jamun**  
gulab jamun, texture of 836
- Juices**  
sugarbeet, N<sub>2</sub> & juice quality in 776
- Kidney beans**  
*Phaseolus vulgaris*, trypsin inhibitors/lectin analysis in 755
- Kneading**  
pasta production, raw material kneading during 813
- Lactic acid**  
beef carcasses, processing & lactic acid microbiological effects on 851
- Lactic acid bacteria**  
bread dough fermentation, lactic acid bacteria & amino acid metabolism during 807
- Lactose**  
nutrient effect of lactose 802
- Lactose dehydrogenase**  
*Geotrichum candidum*, lactose dehydrogenase purification/characterization from 732
- Lecithin**  
rice bran oil gums, lecithin from 919
- Lectins**  
kidney beans, lectins analysis in 755
- Legislation**  
food irradiation & legislation 948  
food law-2000 949  
food packaging, legislation on 704
- Leucaena leucocephala**  
see Subabul
- Lipases**  
rice bran lipases, microwaves & inactivation of 921
- Lipids**  
broiler meats, diets & lipid composition of 867
- Lipoxygenases**  
acid soaking & activity of soybean lipoxygenases 766
- Liquid chromatography**  
bisphenol, detn. LC of 720  
rapeseed glucosinolates, detn. LC of 762  
shrimps, 4-hexylresorcinol detn. LC in 880
- Listeria monocytogenes**  
chicken nuggets, *L. monocytogenes* growth on precooked stored 866  
nisin & sensitivity/resistance of *L. monocytogenes* 727  
potassium sorbate inhibition of *L. monocytogenes* 736
- Lupins**  
fat/protein source 903
- Mackerels**  
packaging-vacuum/ascorbic acid/frozen storage & Fe content of mackerels 886  
processing/frozen storage & Fe content of mackerels 883
- Mandarin oranges**  
pectin methylesterase purification/properties from Mandarin orange fruit 790
- Mangoes**  
water vapour adsorption isotherms of mangoes 788
- Meat**  
broilers, meat yield of synthetic dam line 863  
minced meat, *Pediococcus* sp. antibacterial activity in 842  
ohmic heating & electrical conductivities of meat 716  
refrigerated meat, microbial



- quality P-nitroaniline test assessment for 841
- starter cultures, growth characteristics of meat 859
- Meat products**
  - cooking temp. & colour formation/nitrite decomposition/sarcoplasmic protein denaturation in processed meat products 860
  - microorganisms in meat processing plant & meat product shelf-life 843
- Media**
  - fecal coliform enumeration, agar medium for 725
- Melting**
  - triglycerides, melting DSC measurement in 797
- Metabolism**
  - bread dough fermentation, microorganisms & amino acid metabolism during 807
- Microbial quality**
  - beef, distribution & microbial quality of low-fat ground 844
  - black pepper, microbial quality of 930
  - meat, microbial quality
    - P-nitroaniline test assessment for refrigerated 841
- Microorganisms**
  - beef carcasses, processing & lactic acid microbiological effects on 851
  - cryosectioning/microscopy for microbial growth detection 722
- Microscopy**
  - microbial growth detection by microscopy 722
- Microstructure**
  - egg yolk granules, mineral cations & microstructure of 875
- Microwaves**
  - beef roasts, microwave cooking & properties of 849
  - foods, microwave & drying rates of 713
  - oil palm fruits, microwave energy & oil recovery from 916
  - palm oils, microwave heating & vitamin E oxidative stability/fatty acids production in 917
  - rice bran lipases, microwaves & inactivation of 921
- Milk**
  - economics of milk production, Trivandrum 815
  - fermented milk effect on faecal lactobacilli/coliforms 818
  - fermented milk, cholesterol lowering activity of ropy 816
  - heating & galactose/tagatose formation in milk 817
  - infant formulas, buffering capacity of goat milk/cow milk based 890
  - yoghurts, proteolysed milk & physical properties of 837
- Milk powders**
  - heat treatment/storage & properties of milk powder 822
  - storage stability of milk powder 821
- Milk products**
  - processed/preserved-traditional Sikkimese tribe milk products 823
- Minced foods**
  - fish/wheat flour blends, extrusion & rheological properties of minced 885
- Minerals**
  - egg whites, minerals & properties of spray-dried heat-treated 874
  - egg yolk granules, mineral cations & microstructure of 875
- Miso**
  - rice protein changes during fermentation of miso 743
- Mixing**
  - pasta production, raw material mixing during 813
- Moisture content**
  - black pepper, moisture content of 930
  - bread, moisture & specific heat of 810
  - chicken meat, sodium tripolyphosphate & moisture retention in 864
- Moringa oleifera**
  - seedling foliage nutritive value of *M. oleifera* 928
- Morning glory**
  - fat/protein source 903
- Mozzarella cheese**
  - proteolysis during refrigerated storage in Mozzarella cheese 831
- Muscles**
  - porcine salt-soluble proteins, muscle fiber type & thermal transitions in 840
- Mushrooms**
  - Agaricus bisporus*, stipe trimming & shelf-life of fresh 729
- N-alkylpyrroles**
  - corn oils/amino acids, N-alkylpyrroles formation in 719
- Neem**
  - chillies, neem pest control in 938
- Neem seed protein isolates**
  - preparation/surfactant properties of neem seed protein isolate
  - N-acyl condensate/hydrolysates 940
- Nisin**
  - Listeria monocytogenes*, nisin & sensitivity/resistance of 727
- Nitrates**
  - potatoes, irradiation/packaging & nitrate-nitrogen concn. of 778
- Nitrites**
  - meat products, cooking temp. & nitrite decomposition in processed 860
- Nitrogen**
  - Cheddar cheese, nitrogen fractions in buffalo milk based 827
  - potatoes, irradiation/packaging & nitrate-nitrogen concn. of 778
  - sugarbeet, N<sub>2</sub> & juice quality in 776
  - sunflower stalk N enriched & oil content 771
- Nutrients**
  - chickpeas, Zn application & nutrient content in 751
  - lactose, nutrient effect of 802
  - sugarcane, micronutrients & quality of 803
- Nutritional evaluation**
  - breadfruit-containing composite flour products, nutritional evaluation of 805
- Nutritional values**
  - cowpeas, nutritional quality of hard-to-cook/processed 752
  - Moringa oleifera* seedling foliage, nutritive value of 928
- Odour**
  - green tea, odour characterization of 902
- Oils**
  - N/P enriches sunflower stalk & oil content 771
  - adulteration detection in vegetable oils 907
  - extraction ethyl alcohol of vegetable oils 910
  - phospholipids effect on enzyme-catalysed transesterification of oils 909
  - potato products, frying deep-fat & oil uptake in restructured 779
- Oilseeds**
  - amino acid composition of oilseed deoiled meals 766

- Oleoresin
  - garlic oleoresin 927
- Olive oils
  - deacidification supercritical fluid extraction of olive oils 914
- Onions
  - husk, pectin content of onion 787
- Orange juices
  - aroma volatiles absorption by laminated carton package & sensory quality of orange juices 899
  - browning reaction products anti-oxidative activity of storage-aged orange juices 900
- Oryza sativa*
  - see Rice
- Ovine
  - carcasses, post-exsanguination infusion & tenderness indicators/muscle microstructure of 852
- Owoh
  - fermented seasoning agent from cottonseed 759
- Oxidation
  - beef, distribution & oxidation of low-fat ground 844
  - coconut oils, processing & oxidative stability in 911
  - egg powders, chemical changes radiation induced in whole 873
  - palm oils, microwave heating & vitamin E oxidative stability in 917
- Ozone
  - foods, ozone & preservation of 703
- Packaging
  - almonds, packaging conditions & stability of peeled 757
  - foodstuffs, plastic films for packaging 709
  - legislation on food packaging 704
  - mackerels, vacuum packaging & Fe content of 886
  - potatoes, packaging & nitrate-nitrogen concn. of 778
  - product-package interaction 705
  - retail trade & packaging-2000 706
- Packaging materials
  - orange juices, aroma volatiles absorption by laminated carton package & sensory quality of 899
- Packaging modified atmosphere
  - pork, physicochemical changes in MAP/irradiated fresh 853
- Paddy
  - rice starch, storage temp. paddy & properties of 740
- Palatability
  - beef, electrical stimulation/postmortem aging & palatability properties of 848
- Palm oils
  - dry process for palm oil extraction 915
  - microwave energy & oil recovery from oil palm fruits 916
  - microwave heating & vitamin E oxidative stability/fatty acid production in palm oils 917
- Palmolein
  - ghee, palmolein detection in 833
  - groundnut oil, palmolein detection in 907
- Paprika
  - powders, colour substances stability in paprika 929
- Pasta
  - production, raw material mixing/kneading/pressing during pasta 813
- Pastes
  - tomato pastes, *Bacillus coagulans* thermal resistance in conc. 786
  - tomato pastes, carotenoids food preparation effect in 785
- Pasting
  - potato starch pastes, pasting characteristics of 781
- Pathogens
  - cheese, pathogens in 824
- Pectins
  - fruits/plant parts, pectin content of 787
  - mandarin orange fruit, pectin methylesterases purification/properties from 790
  - sunflower head pectin, extraction/characteristics of 774
  - sunflower head pectin, gelling characteristics of 773
- Pediococcus damnosus*
  - meat, *P. damnosus* sp. antibacterial activity in minced 842
- Pediococcus pentosaceus*
  - ham, *P. pentosaceus* proteolytic activity detection in dry-cured 861
  - meat, *P. pentosaceus* sp. antibacterial activity in minced 842
- Pepper
  - Piper nigrum powder, GC analysis/sensory profiles of stored 931
- Peptides
  - Cheddar cheese, peptides of buffalo milk based 829
- Peroxidases
  - French beans, peroxidases & blanching of 754
- Peroxide values
  - soybean oils, activated carbons & peroxide values of autoxidized 922
- Peroxides
  - shortenings, peroxide stability in 926
- Pesticides
  - poultry, pesticide contaminated feed effect on 862
- Pests
  - chillies, insecticides pest control in 938
- Phaseolus vulgaris*
  - see French beans
- Phenolic compounds
  - cheeses, phenolic compounds & flavour of 825
- Phosalone
  - chillies, phosalone pest control in 938
- Phosphates
  - porcine salt-soluble proteins, phosphates & thermal transitions in 840
- Phosphatides
  - rice bran oil gums, powder phosphatides from 919
- Phospholipids
  - coconut oils, phospholipids & crystallization of 912
  - oils, phospholipids effect on enzyme-catalyzed transesterification of 909
- Phosphorus
  - sunflower stalk P enriched & oil content 771
- Phosphorylation
  - soy protein isolates, phosphorylation-enzymatic & functional properties of 770
- Physical properties
  - cakes, groundnut hull flour & physical properties of low-calorie 811
  - coffee beans, roasting & physical properties of 897
  - groundnut pastes, temp. & physical properties of 761
  - milk powder, heat treatment/storage & physical properties of 822
  - pork leg roasts, cooking temp. & physical properties of fresh 854
  - pork, physical properties of MAP/irradiated fresh 853



- p soy proteins, physicochemical properties of isolated 769
- 
- p yoghurts, proteolysed milk & physical properties of 837
- 
- Pineapples**
- 
- p Ananas comosus, volatile constituents of green/ripened 791
- 
- p drying-air behaviour of fresh/osmotically dehydrated pineapples 792
- 
- p water vapour adsorption isotherms of pineapples 788
- 
- Piper nigrum**
- 
- p see Pepper
- 
- Plastics**
- 
- p foodstuffs, plastic films for packaging 709
- 
- Polymers**
- 
- p vinyl polymers, extrusion-grafting starch onto 801
- 
- Pork**
- 
- p heat transfer coeff. for restructured pork/soy products 856
- 
- p leg roasts, cooking temp. & properties of fresh pork 854
- 
- p mixtures, chicken meat detection ELISA in beef-pork 855
- 
- p physicochemical changes in MAP/irradiated fresh pork 853
- 
- Potassium**
- 
- p baby foods, K as index in fruit based 889
- 
- Potassium sorbate**
- 
- p cucumber, potassium sorbate & NaCl reduction during fermentation/storage of 784
- 
- p Listeria monocytogenes, potassium sorbate inhibition of 736
- 
- Potato products**
- 
- p frying-deep-fat & oil uptake in restructured potato products 779
- 
- Potato starch**
- 
- p gelatinization & rheological properties of potato starch 782
- 
- p pastes, pasting characteristics of potato starch 781
- 
- p potatoes, starch properties of irradiated/stored 780
- 
- Potatoes**
- 
- p cv./sp. gr./location & puncture force of raw potatoes 777
- 
- p irradiation/packaging & nitrate-nitrogen concn. of potatoes 778
- 
- Poultry**
- 
- p pesticide contaminated feed effect on poultry 862
- 
- Powders**
- 
- p calm powder, Staph. aureus growth/enterotoxin production in 878
- 
- p paprika powders, colour substances stability in 929
- 
- Prenyl alcohol**
- 
- p coffee, prenyl alcohol-odorants in roasted 896
- 
- Preservation**
- 
- p ozone & preservation of foods 703
- 
- Processing**
- 
- p coconut oils, processing & composition/oxidative stability of 911
- 
- p cod/mackerels, processing & Fe content of 883
- 
- Prosomillet**
- 
- p egg quality traits & prosomillet 869
- 
- Proteases**
- 
- p biosynthesis Rhizopus oryzae & optimization of extracellular protease 730
- 
- p microorganisms & production of proteases 726
- 
- p soybean protease inhibitors, chemical investigation of 765
- 
- Protein foods**
- 
- p soy balls-high protein snack 767
- 
- Proteins**
- 
- p Cheddar cheese, protein PAGE of buffalo milk based 828
- 
- p coconut protein, isolation/characterization of 758
- 
- p flavour compounds, proteins microparticulated & interaction of 718
- 
- p ornamental plants source of proteins 903
- 
- p peptidoglutaminase deamidation of proteins/protein hydrolysates 942
- 
- p porcine salt-soluble proteins, phosphates/muscle fiber type & thermal transitions in 840
- 
- Proteins animal**
- 
- p duck salt-soluble proteins, pH & thermal aggregation properties of 868
- 
- p meat products, cooking temp. & sarcoplasmic protein denaturation in 860
- 
- Proteins cereal**
- 
- p miso, rice protein changes during fermentation of 743
- 
- Proteins milk**
- 
- p cheese, protein hydrophobicity spectrofluorimetric estimation in ripening 826
- 
- Proteins vegetable**
- 
- p faba beans, cooking & proteins of 753
- 
- Proteolysis**
- 
- p beer, yeast proteolytic enzymes release into 892
- 
- p ham, microorganisms proteolytic activity detection in dry-cured 861
- 
- p Mozzarella cheese, proteolysis during refrigerated storage in 831
- 
- Prunus avium**
- 
- p see Sweet cherries
- 
- Pseudomonas fluorescens**
- 
- p chicken nuggets, Ps. fluorescens growth on precooked stored 866
- 
- p proteases, Ps. fluorescens & production of 726
- 
- Pseudomonas fragi**
- 
- p proteases, Ps. fragi & production of 726
- 
- Pulps**
- 
- p fruit pulps, heat of dehydrated 789
- 
- Quality**
- 
- p black tea, withering process & quality of 901
- 
- p broilers, quality of synthetic dam line 863
- 
- p cocoa beans, seasons/drying temp. & quality of 794
- 
- p egg albumin quality & Haugh unit score 872
- 
- p fried foods, soybean oil rancidity & quality of 924
- 
- p rapeseed oils, drying temp. & quality of 918
- 
- p scallop meats, quality losses in frozen 879
- 
- p seafood industries, HACCP & quality in 876
- 
- p sugarcanes, micronutrients & quality of 803
- 
- p sugarcanes, urea & quality of 804
- 
- p sunflower seed, seed magnetic treatment & quality of 772
- 
- Radiation**
- 
- p honeys, Cl. botulinum/B. subtilis spores gamma-radiation resistance in 798
- 
- Rancidity**
- 
- p fried foods, soybean oil rancidity & quality of 924
- 
- Rapeseed oils**
- 
- p drying temp. & quality of rapeseed oils 918
- 
- Rapeseeds**
- 
- p glucosinolates, detn. LC of rapeseed 762
- 
- Resistant starch**
- 
- p review 800

**Restructured foods**

pork/soy products, heat transfer  
coeff. for restructured 856

**Rheological properties**

fish/wheat flour blends,  
extrusion & rheological  
properties of minced 885  
potato starch, gelatinization &  
rheological properties of 782  
rice slurries, flow properties of  
cooked 744

**Rhizopus oryzae**

protease biosynthesis, *R. oryzae*  
& optimization of extracellular  
730

**Rice**

miso, rice protein changes during  
fermentation of 743  
*Oryza sativa* grain, biochemical  
changes during  
maturation/development of 741  
*Oryza sativa*, preharvest Zn  
application & Zn content of 742  
slurries, viscosity/flow  
properties of cooked milled rice  
744

**Rice bran**

microwaves & inactivation of rice  
bran lipase 921  
oil/fatty acids estimation in  
rice bran 920

**Rice bran oils**

gums, lecithin/powder  
phosphatides from rice bran oil  
919  
rice bran, oil estimation in 920

**Rice starch**

storage temp. paddy & properties  
of rice starch 740

**Ripening**

cheese, protein hydrophobicity  
spectrofluorimetric estimation  
in ripening 826  
sweet cherries, volatile  
compounds during ripening of 793

**Roasted foods**

coffee, prenyl alcohol-odorants  
in roasted 896

**Roasting**

coffee beans, roasting  
physicochemical changes in 897

**Salad**

*Staph. aureus* growth/enterotoxin  
production in salad bar  
ingredients 878

**Salmon**

chum salmon, sexual maturity &  
textural changes of canned 887

**Salmonella**

black pepper, *Salmonella* in 930

rapid *Salmonella* assay 728

**Salt**

Cheddar cheese, histamine  
production in low-salt 830  
soups, salt concn. in 935

**Sanitizers**

UF systems, CO<sub>2</sub> corrosivity  
as sanitizer in 733

**Sausages**

fermented sausages, smoking &  
staphylococcal  
growth/enterotoxin production in  
858  
glutamic acid detn. enzymatic in  
minced sausages 857

**Scallops**

meats, quality losses in frozen  
scallops 879

**Seafoods**

HACCP & quality in seafood  
industries 876  
industries-seafood processing,  
Orissa 877

**Seasonings**

fish muscles, seasonings &  
volatile acids from 884

**Seasons**

cocoa beans, seasons & quality of  
794

**Selenium**

arachidonic acid  
metabolism/hemostatic function  
in rats, dietary Se effect on 943

**Sensory evaluation**

beer, sensory evaluation of 891  
cakes, groundnut hull flour &  
sensory evaluation of  
low-calorie 811  
control chart technique &  
panelist performance 936

**Sensory properties**

beef roasts, cooking/reheating &  
sensory properties of 849  
black pepper powder, sensory  
properties of stored 931  
pork leg roasts, cooking temp. &  
sensory properties of fresh 854  
pork, sensory properties of  
MAP/irradiated fresh 853

**Sensory quality**

orange juices, aroma volatiles  
absorption by laminated carton  
package & sensory quality of 899

**Sesame oils**

water melon seed oil adulteration  
detection in sesame oils 908

**Sex**

chum salmon, sexual maturity &  
textural changes in 887

**Shelf-life**

microorganisms in meat processing  
plant & meat product shelf-life  
843

mushrooms, stipe trimming &  
shelf-life of fresh 729

**Shortenings**

peroxide stability in shortenings  
926

**Shrimps**

4-hexylresorcinol detn. LC in  
shrimps 880

**Skim milk**

heat stability of conc. skim milk  
820

**Smoking**

sausages, smoking &  
staphylococcal  
growth/enterotoxin production in  
fermented 858

**Snacks**

soy balls-high protein snack 767

**Soaking**

soybean lipoxxygenase activity,  
acid soaking & activity of 766

**Sodium**

diabetics/hypertensives, dietary  
Na intake in 939

**Sodium ascorbate**

surimi, sodium ascorbate &  
gel-forming properties of 888

**Sodium chloride**

cucumber, CaCl<sub>2</sub>/potassium  
sorbat & NaCl reduction during  
fermentation/storage of 784

**Sodium tripolyphosphates**

chicken meat, sodium  
tripolyphosphate & moisture  
retention/textural properties of  
864

**Sorghum**

mash, fermentation pseudo-steady  
heat conduction model of sorghum  
748

**Soups**

glutamic acid detn. enzymatic in  
dried soups 857  
salt concn. in soups 935

**Sourness**

carbonation interaction with  
sourness 932

**Soy balls**

see Soy products

**Soy products**

heat transfer coeff. for  
restructured pork/soy products  
856

soy balls-high protein snack 767

**Soy proteins**

isolates,  
phosphorylation-enzymatic &



- functional properties of soy proteins 770
- physicochemical properties of isolated soy proteins 769
- Soybean oils**
  - carbons-activated & peroxide/TBA/carbonyl values of autoxidized soybean oils 922
  - fried foods, soybean oil rancidity & quality of 924
- Soybeans**
  - aw/temp/incubation time & aflatoxin B<sub>1</sub> in soybeans 764
  - biochemical characterization of low trypsin inhibitor soybeans 763
  - Glycine max, S & composition of 749
  - infant formulas, buffering capacity of soy-based 890
  - lipoxygenases, acid soaking & activity of soybean 766
  - protease inhibitors, chemical investigation of soybean 765
  - sludge, CO<sub>2</sub> supercritical & tocopherol concn. from soybean 923
  - tofu, soybean components & texture of 768
- Spectrofluorimetry**
  - cheese, protein hydrophobicity spectrofluorimetric estimation in ripening 826
- Spectroscopy**
  - fats, trans unsaturation low level detn. spectroscopy in 905
- Spices**
  - fish muscles, spices & volatile acids from 884
- Spinach**
  - carotenoids food preparation effect in spinach 785
- Spirulina platensis**
  - iron bioavailability from S. Platensis 734
- Squilla**
  - uses of squilla 881
- Stability**
  - almonds, packaging conditions & stability of peeled 757
  - coconut oils, processing & oxidative stability in 911
  - colour substances stability in 929
  - fruit preparation, sundae style yoghurt fermentation & aspartame stability in 838
  - milk powder, storage stability of 821
  - palm oils, microwave heating & vitamin E oxidative stability in 917
  - paprika powders, colour substances stability in 929
  - shortenings, peroxide stability in 926
  - skim milk, heat stability of conc. 820
  - wine coolers, juice content/citric acid & storage stability of 893
- Stabilization**
  - wheat germs, stabilization of 745
- Staphylococcus**
  - sausages, smoking & staphylococcal growth in fermented 858
- Staphylococcus aureus**
  - ham, Staph. aureus proteolytic activity detection in dry-cured 861
- Staphylococcus aureus**
  - salad bar ingredients/clam powder, Staph. aureus enterotoxin growth/production in 878
- Starch**
  - amylases & degradation of enzyme-resistant starch 799
  - faba beans, processing/cooking & starch digestibility of 753
  - resistant starch, review 800
  - vinyl polymers, extrusion-grafting starch onto 801
- Starters**
  - meat starter cultures, growth characteristics of 859
- Steel**
  - benzotriazole & corrosion inhibition of mild steel 708
- Storage**
  - cookies, egg yolk antioxidant activity during storage of 812
  - groundnuts, maturity & freeze damage in stored 760
  - pepper powder, GC analysis/sensory profiles of stored black 931
  - rice starch, storage temp. paddy & properties of 740
  - wine coolers, juice content/citric acid & storage stability of 893
- Storage cold**
  - frozen foods, heat transfer coeff. in stored 712
  - Mozzarella cheese, proteolysis during refrigerated storage in 831
- Storage controlled atmosphere**
  - food grains, CO<sub>2</sub> monitoring method for controlled atm. stored 937
- Storage frozen**
  - cod/mackerels, frozen storage & Fe content of 883
  - mackerels, frozen storage & Fe content of 886
- Storage milk**
  - milk powder, heat treatment/storage & properties of 822
  - milk powder, storage stability of 821
- Storage modified atmosphere**
  - chicken nuggets, Listeria monocytogenes/Pseudomonas fluorescens growth on precooked stored 866
- Storage vegetables**
  - cucumber, CaCl<sub>2</sub>/potassium sorbate & NaCl reduction during storage of 784
  - potatoes, starch properties of irradiated/stored 780
- Subabul**
  - Leucaena leucocephala-source of gum 737
- Sugarbeet**
  - Beta vulgaris, N<sub>2</sub> & juice quality in sugarbeet 776
- Sugarcanes**
  - micronutrients & quality of sugarcanes 803
  - urea & quality of sugarcanes 804
- Sulphur**
  - legumes, S & composition of 749
- Sunflower oils**
  - oil composition/characteristics of sunflower seed var. 925
- Sunflower seeds**
  - var., oil composition/characteristics of sunflower seed 925
- Sunflowers**
  - oil content & N/P enriched sunflower stalk 771
  - pectin, extraction/characteristics of sunflower head 774
  - pectin, gelling characteristics of sunflower head 773
  - seed magentic treatment & quality of sunflower seed 772
- Surimi**
  - sodium ascorbate & gel-forming properties of surimi 888
- Sweet cherries**
  - Prunus avium, volatile compounds

- during fruit development/ripening of 793
- Sweet potato starch**
  - Chalara paradoxa* glucoamylase & hydrolysis of sweet potato starch 783
- Sweeteners**
  - evaluation of high-intensity sweeteners 739
- Sweetness**
  - carbonation interaction with sweetness 932
  - fruit punch flavoured beverages, colour & sweetness in 898
- Tagatose**
  - milk, heating & tagatose formation in 817
- Tastes**
  - consumer preference & measurement of food tastes 933
- Tea**
  - black tea, withering process & quality of 901
  - green tea, odour characterization of 902
- Tempeh**
  - yam beans, tempeh from 750
- Tenderness**
  - ovine carcasses, post-exsanguination infusion & tenderness indicators of 852
  - pork leg roasts, cooking temp. & tenderness of 854
- Texture**
  - chicken meat, sodium tripolyphosphate & textural properties of 864
  - chicken/corn starch, extruder die temp. & texture/microstructure of restructured mechanically deboned 865
  - chum salmon, sexual maturity & textural changes of canned 887
  - gulab jamun, texture of 836
  - pork leg roasts, cooking temp. & texture of fresh 854
  - pork, texture of MAP/irradiated fresh 853
  - tofu, soybean components & texture of 768
- Theobroma cacao**
  - see Cocoa beans 794
- Thermal processing**
  - tomato pastes, *Bacillus coagulans* thermal resistance in conc. 786
- Thermal properties**
  - duck salt-soluble proteins, pH & thermal aggregation properties of 868
  - frozen foods, thermal properties of 711
  - porcine salt-soluble proteins, phosphates/muscle fiber type & thermal transitions in 840
- Thiamines**
  - electrolytes & loss of thiamine 941
- Thiobarbituric acid values**
  - soybean oils, activated carbons & TBA values of autoxidized 922
- Tocopherols**
  - soybean sludge, CO<sub>2</sub> supercritical & tocopherol concn. from 923
- Tofu**
  - soybean components & texture of tofu 768
- Tomato pastes**
  - Bacillus coagulans* thermal resistance in conc. tomato pastes 786
  - carotenoids food preparation effect in tomato paste 785
- Tomatoes**
  - carotenoids food preparation effect in tomatoes 785
- Traditional foods**
  - milk products, processed/preserved-traditional Sikkimese tribe 823
- Trebon**
  - chillies, trebon pest control in 938
- Triglycerides**
  - crystallization/melting DSC measurement in triglycerides 797
- Trypsin inhibitors**
  - kidney beans, trypsin inhibitors analysis in 755
  - soybeans, biochemical characterization of low trypsin inhibitor 763
- UHT milk**
  - volatile flavour compounds solid phase extraction from UHT processed milk 819
- Urea**
  - sugarcanes, urea & quality of 804
- Utilization**
  - CO<sub>2</sub> corrosivity as sanitizer in UF systems 733
- Vector**
  - cloning vector, pFMO11 as possible food-grade 947
- Vegetables**
  - ohmic heating & electrical conductivities of vegetables 716
- Viburnum coriaceum**
  - deoiled meals, protein content of *V. coriaceum* seed 756
- Vigna mungo**
  - see Blackgram
- Vigna radiatus**
  - see Greengram
- Vigna sinensis**
  - see Cowpeas
- Viscosity**
  - guar gum, viscosity of carboxymethyl/hydroxypropyl 738
  - rice slurries, viscosity of cooked 744
- Vitamin E**
  - palm oils, microwave heating & vitamin E oxidative stability in 917
- Volatile compounds**
  - beef, diet & volatile concn. of 845
  - fish muscles, spices/seasonings/additives & volatile acids from 884
  - pineapples, volatile constituents of green/ripened 791
  - sweet cherries, volatile compounds during fruit development/ripening of 793
- Wastes**
  - dairy wastes, red mud & treatment of 814
  - poultry waste recycling in integrated fish farming 882
- Water melon seed oils**
  - groundnut oils/sesame oils, water melon seed oil adulteration detection in 908
- Water-chestnut**
  - husk, pectin content of water-chestnut 787
- Wheat**
  - bread dough, uniaxial/biaxial tensile tests with wheat 808
  - iron bioavailability from whole wheat 734
  - Triticum vulgare*, preharvest Zn application & Zn content of 742
- Wheat flour**
  - fish/wheat flour blends, extrusion & rheological properties of minced 885
- Wheat germ**
  - stabilization of wheat germs 745
- Wheat starch**
  - gels, retrogradation behaviour of wheat starch 746
- Whey proteins**
  - cross-linking activity of placental 839
- Wines**
  - coolers, juice content/citric acid & storage stability of wine



**Wrightia tomentosa**

decoiled meals, protein content of

Wr. tomentosa 756

**Xanthan gum**Leucaena leucocephala gum &  
xanthan gum interaction 737**Yam beans**Sphenostylis stenocarpa, tempeh  
from 750**Yeast brewer's**beer, yeast proteolytic enzymes  
release into 892**Yeasts**bioconversions & yeasts, review  
702Geotrichum candidum, lactose  
dehydrogenasepurification/characterization  
from 732osmotic shock on osmotolerant  
yeasts 731**Yoghurts**

fruit preparation, sundae style

yoghurt fermentation & aspartame  
stability in 838proteolysed milk & physical  
properties of yoghurts 837**Zinc**chickpeas, Zn application &  
nutrient content in 751rice/wheat, preharvest Zn  
application & Zn content of 742





## GENERAL

950

Potty (VH). **Impact of new industrial policy on development of food processing industry.** *Indian Food Industry* 11(4): 1992: 20-27

Statistics of the various types of primary and secondary food processing industries in India, the evolution of industrial development policy, impact of the new industrial development policy on the different components of food processing sector and on the development of food industry, specified food industries that come under the new policy, the change in the socio-economic environment, food processing and export scenario of food materials, glimpses of the food processing and market place changes in India, futuristic situation of food resources and food industry and the changing market perceptions are the aspects presented in this article. CSA

## FOOD PROCESSING

951

Gibbons (RJ). **Vision for food processing.** *Food Australia* 44(10): 1992: 456-458

This article reviews some image processing techniques suitable for the agricultural and food environment and the difficulties in their application, current applications, current research on image processing for agricultural and food applications, future directions and limitations of image processing. 25 references. SRA

952

Harlfinger (L). **Microwave sterilization.** *Food Technology* 46(12): 1992: 57-59, 61

Microwave processing of foods offers product as well as processing advantages over conventional sterilization processes. The advantages offered are (1) microwave sterilization can deliver products that tastes good because microwaves are able to heat product 3-5 times faster than conventional sterilization systems (2) the microwave-sterilized product is not temp. abused, so the food looks better, has better texture and tastes better (3) products can be transferred directly from the packaging line and do not have to be batched or loaded onto racks and (4) increased automation and reduced labour requirement. CSA

953

Schlegel (W). **Commercial pasteurization and sterilization of food products using microwave technology.** *Food Technology* 46(12): 1992: 62-63

Use of microwave technology to continuously pasteurize or sterilize food products can provide a variety of benefits such as improvement of food quality; extension of shelf-life without using preservatives; maintenance of natural appearance, crunchiness and flavour; lower distribution of cost because of longer shelf-life; energy savings; low maintenance costs, minimal personnel; and technology that is environmentally friendly. CSA

954

Parrott (DL). **Use of ohmic heating for aseptic processing of food particulates.** *Food Technology* 46(12): 1992: 68-72

The development of ohmic heating which operates by the direct passage of electrical current through the continuous flow of food product is discussed in this article. Heat penetration throughout the product is far more rapid and even, resulting in high levels of flavour retention and particulate integrity. Aspects covered are thermal processing options, ohmic heating, ohmic aseptic processing, (equipment sterilization, processing, alternative cooling, cleaning, production capacity), product quality (process validation, cook value) and the potential applications. CSA

## FOOD PACKAGING

### Packaging materials

955

Technology Information Forecasting and Assessment Council (NewDelhi). **Packaging materials industry in India.** *Indian Food Industry* 11(4): 1992: 42-46, 27

Presents an overview of the percentage usage of major packaging materials for bulk and consumables, the current consumption pattern of various raw materials used for packaging, the status of various material processing technology and the product-wise technologies in use and the emerging trends are detailed in this article. CSA

## FOOD ENGINEERING AND EQUIPMENT

956

Mcguire (J) and Yang (J). **The effect of drop volume on contact angle.** *Journal of Food Protection* 54(3): 1991: 232-235

The effect of drop vol. on the equilibrium contact angle, used in evaluation of food contact surface properties, was measured for liquids exhibiting both polar and nonpolar character on 6 different materials. Drop vol. used ranged from 2 to 40  $\mu$ l. Contact angles were observed to increase with increasing drop vol. in a range below some limiting value, identified as the critical drop vol. (CDV). The CDV varied among materials and is explained with reference to surface energetic heterogeneities exhibited by each type of solid surface. AA

957

Sastry (SK). **Application of ohmic heating to continuous sterilization of food.** *Indian Food Industry* 11(4): 1992: 28-30, 41

The fundamentals of ohmic heating of food, the mechanism of microbial death, results of the observation made on ohmic heating of liquid-particle mixtures and the important issues to be considered during the design of an ohmic heating process are the aspects dealt in this article. CSA

958

Schiffmann (RF). **Microwave processing in the US food industry.** *Food Technology* 46(12): 1992: 50-52, 56

The origin of industrial microwave heating, criteria for processing with microwaves, the reasons for success and failure of potato chip drying, chicken processing, bacon cooking, precooking of sausage patties, meat tempering, pasta drying, donut proofing and frying, bread baking and pasteurization using microwave systems are discussed in this article. CSA

959

Datta (AK) and Hu (W). **Optimization of quality in microwave heating.** *Food Technology* 46(12): 1992: 53-56

The ranges of typical heat-generation rates and temp. rise for microwave and conventional heating are compared. The results show that the microwave heating generally produces less thermal degradation of food products than conventional heating processes, but this is not always true. CSA

960

Schrader (GW), Litchfield (JB) and Schmidt (SJ). **Magnetic resonance imaging applications in the food industry.** *Food Technology* 46(12): 1992: 77-83

The article introduces the basic principles of Magnetic Resonance Imaging (MRI), reviews some of

the current applications of MRI to food-related research (internal composition and quality factors, volume measurement and parameter mapping, mass transfer and structural changes, heat transfer and food stability) and discusses the future applications of MRI in the food industry (shorter imaging times, solids imaging, microscopic MRI, imaging probes and gradient systems, contrast agents and on-line sensing). CSA

## ENERGY IN FOOD PROCESSING

Nil

## FOOD CHEMISTRY AND ANALYSIS

### Chemistry

961

Gomez (R) and Fernandez-Salguero (J). **Water activity and chemical composition of some food emulsions.** *Food Chemistry* 45(2): 1992: 91-93

The mean  $a_w$  values for various food emulsions assayed were 0.904 plus or minus 0.050 for butter samples, 0.914 plus or minus 0.028 for margarines and 0.947 plus or minus 0.013 for mayonnaises. The linear regression equation  $a_w = 0.954 - 0.03 m$  could predict  $a_w$  for butter and margarine with an error  $< 0.02$  units from the NaCl content of their aqueous phase ( $m$ ) while that for mayonnaises could be predicted through the Chen equation for mixtures of solutes. SD

962

Nakao (Y). **Curdlan: Properties and application to foods.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 38(8): 1991: 736-742 (Ja)

963

Hamada (JS). **Effects of heat and proteolysis on deamidation of food proteins using peptidoglutaminase.** *Journal of Agricultural and Food Chemistry* 40(5): 1992: 719-723

Enzymatic methods were developed for the deamidation of food proteins. Modification of proteins by peptidoglutaminase was dependent on their size and conformation. After such treatments as heat or alkali solubilization, which might have partially broken hydrogen and disulphide bonds, peptidoglutaminase deamidation of proteins increased by proteolysis as a function of percent peptide bond hydrolysis (DH), up to 54-fold at 20%



DH. With prior heat treatment at 100°C for 15 min, followed by proteolysis and alkali solubilization of soy protein, casein and gluten, over 48, 37, and 39% protein deamidation can be achieved, respectively. AA

964

Losada (PP), Lozano (JS), Abuin (SP), Mahia (PL) and Gandara (JS). **Kinetics of the hydrolysis of bisphenol F diglycidyl ether in water-based food simulants. Comparison with bisphenol A diglycidyl ether.** *Journal of Agricultural and Food Chemistry* 40(5): 1992: 868-872

The first-order degradation kinetics of Bisphenol F diglycidyl ether (BFDGE) in 3 water-based food simulants [3% (w/v) acetic acid, distilled water, and 15% (v/v) ethanol] at various temp. were studied. BFDGE and its first and second hydrolysis products were determined by reversed phase HPLC with fluorescence detection. Nonlinear regression was used to fit the experimental data at 40, 50 and 60°C with the proposed kinetic equations; the Arrhenius equation was then fitted to the rate constants obtained, and the kinetic models were tested by comparing experimental data obtained at 70°C with kinetic curves calculated using the rate constants predicted for this temp. The half-life of BFDGE was longest in ethanol and shortest in acetic acid. The difference between the hydrolysis rates of BFDGE and Bisphenol A diglycidyl ether may be due to 10% of the BFDGE used being in  $n = 1$  monomer form. The results imply that resins which comply with existing legislation on the migration of unreacted monomer may still contaminate foodstuffs. AA

#### Chemistry(Analytical)

965

Landry (J) and Delhay (S). **Simplified procedure for the determination of tryptophan of foods and feedstuffs from barytic hydrolysis.** *Journal of Agricultural and Food Chemistry* 40(5): 1992: 776-779

A procedure simplifying the treatment of barytic hydrolysate prior to chromatographic analysis of tryptophan was tested on 8 samples of foods and feedstuffs. It involves the addition of 5-methyl-tryptophan as internal standard to the mixture subjected to hydrolysis, the dilution of a very small vol. (3  $\mu$ L) of liquid phase of cold (0°C) hydrolysate with 1 mL of pH 4.5 buffer, and the chromatography of aliquots after dilution. Tryptophan was evaluated from 5-methyltryptophan. The simplified procedure compared with the conventional one, using the remainder of hydrolysate and requiring acidification, quantitative transfer, and clarification,

gave identical results irrespective of samples. It is convenient and precise and leads to routine detn. of tryptophan of a large number of samples. AA

966

Santerre (CR), Cash (JN) and Zabik (MJ). **The decomposition of daminozide (alar) to form unsymmetrical dimethylhydrazine (UDMH) in heated, pH adjusted, canned solutions.** *Journal of Food Protection* 54(3): 1991: 225-229

Processing conditions were chosen to determine the influence of temp., pH and processing on model sol. containing daminozide residues. Daminozide (succinamic acid 2, 2-dimethylhydrazide) fortified sol. (12.5 p.p.m.) containing 50mM  $\text{NaH}_2\text{PO}_4$  and 24% sucrose (w/w) were adjusted to pH 3.0, 3.6 or 4.0 and either heated (100°C for 0, 5, 10 or 15 min in sealed cans and cooled or heated (80°C) for 0, 5 or 10 min in open cans, sealed, heated (100°C) for 5 min, and cooled. Daminozide degradation due to heating was < the HPLC detection limit (1.5 p.p.m.) for all of the treatments. Unsymmetrical dimethylhydrazine (UDMH) concn. was significantly affected by heating time, pH and processing. Heating of daminozide sol. in sealed cans produced approx. 1 p.p.m. of UDMH for every min of heating at 100°C. Heating of daminozide sol. in open cans at 80°C resulted in simultaneous production of UDMH in the sol. and loss of UDMH through volatilization. Max. degradation of daminozide was observed at pH 3.6. AA

967

Kaur (H) and Kawatra (BL). **Effect of deep fat frying on the nutritive value of some commonly used fried products.** *Beverage and Food World* 19(4): 1992: 28-29

Presents proximate chemical composition (per 100 g) and mineral contents (mg) of deep fat fried products. Poori: crude protein (CP) - 9.40, ether extract (EE)-8.90, ash-1.15, crude fibre (CF)-1.5, Ca-41.45, Fe-4.52, Zn-0.28, phytin P (PP)-124.0; mattar: CP-9.18, EE-11.75, ash-0.18, CF-0.2, Ca-20.29, Fe-2.72, Zn-0.80, PP-22.0; pakoda: CP-14.9, EE-15.55, ash-3.08, CF-0.4; Ca-43.90, Fe-3.25, Zn-0.29, PP-34.0; Bread pakoda: CP-15.09, EE-14.6, ash-1.76, CF-0.6, Ca-30.50, Fe-3.08, Zn-0.34, PP-28.0. BV

#### Chemistry

968

Karmas (R), Buera (MP) and Karel (M). **Effect of glass transition of rates of nonenzymatic browning in food systems.** *Journal of Agricultural and Food Chemistry* 40(5): 1992: 873-879



The effect of glass transition on nonenzymatic browning of dehydrated vegetables and of model systems (composed of amino acids and sugars reacting in matrices with different physical characteristics) was studied. Glass transition temp. ( $T_g$ ) was determined by differential scanning calorimetry. The rates of nonenzymatic browning were taken from the literature for vegetables and were determined for model systems by measuring absorbance at 280 and 420 nm. Rate constants were analyzed as a function of temp. (T) and of (T -  $T_g$ ). Browning below  $T_g$  was very slow. Changes in activation energy (which were affected by structural changes) could be detected near the glass transition. A complete predictive model must include the variables T, (T -  $T_g$ ), m, and concn. of reactants. AA

## FOOD MICROBIOLOGY AND HYGIENE

### Enzymes

969

Singhal (RS), Sajilata (M) and Kulkarni (PR). **Enzymes as indices of food quality.** *Beverage and Food World* 19(4); 1992; 20-21

A brief description of role of enzymatic indices in quality control of foods is outlined in this review. The food products covered are dairy products; vegetables and fruits; fish and shell-fish products; meat and poultry products, and wheat flour. 16 references. BV

### Fermented foods

970

Kozaki (M). **Microbiological studies on traditional fermented foods in Southeast Asia.** *Journal of Japanese Society for Food Science and Technology* (Nippon Shokuhin Kogyo Gakkaishi) 38(7); 1991; 651-661 (Ja)

Review. 54 references. BV

### Tempeh

971

Penaloza (W), Davey (CL), Hedger (JN) and Kell (DB). **Physiological studies on the solid state quinoa tempeh fermentation using on-line measurements of fungal biomass production.** *Journal of the Science of Food and Agriculture* 59(2); 1992; 227-235

A quantitative approach to the on-line measurement of fungal biomass, based on the biomass-dependent changes in electrical capacitance at 0.30 MHz, was exploited to optimise the solid-substrate tempeh fermentation of *Chenopodium quinoa* Willd by *Rhizopus oligosporus* Saito. Variables including the mould strain, the initial pH, the inoculum density and the substrate moisture content influenced the mycelial development and quality of quinoa tempeh prepared in petri dish fermentation units. It was found that *R. oligosporus* isolate UCW-FF8001 at an inoculation density of  $3.5 \times 10^4$  cfu/g of quinoa substrate at 620 g kg<sup>-1</sup> moisture content yielded both the highest biomass and the best quality tempeh. AA

### Microorganisms

972

Fung (DYC) and Chain (VS). **Comparative analysis of Redigel and aerobic plate count methods for viable cell counts of selected foods.** *Food Microbiology* 8(4); 1991; 299-301

The Redigel system uses a calcium pectate gel in place of agar in an alternative method for determining aerobic colony counts in food. The system was compared with the conventional Aerobic Plate Count method for the detn. of each food being tested. The correlation coeff. for each food product ranged from 0.10 (wheat flour) to 1.00 (pecans) with an overall correlation of 0.964. The Redigel system can be used as a conventional alternative method for the enumeration of bacteria from foods. AA

### Bacteria

973

Wel (CI), Balaban (MO), Fernando (SY) and Peplow (AJ). **Bacterial effect of high pressure CO<sub>2</sub> treatment on foods spiked with *Listeria* or *Salmonella*.** *Journal of Food Protection* 54(3); 1992; 189-193

Studies were carried out to assess the use of high pressure CO<sub>2</sub> treatment for controlling pathogenic microorganisms in model food systems. *L. monocytogenes* suspended in distilled water was completely killed after CO<sub>2</sub> treatment at 6.18 MPa (61.2 atm.) and 35°C for 2 h. Contrary to CO<sub>2</sub> treatment, the use of N<sub>2</sub> at these experimental conditions failed to exert bactericidal effect. High pressure CO<sub>2</sub> treatment at 13.7 MPa (136.1 atm) and 35°C for 2 h was shown to effectively kill *Salmonella* in spiked chicken meat (> 95%) and egg yolk (> 100%), and kill *Listeria* in spiked shrimp (> 99%), orange juice (> 99%), and egg yolk (> 99.4%). Such treatment was, however, less effective in killing *Salmonella* in a whole egg-*Salmonella* mixture.



Furthermore, this treatment caused a twofold increase in bacterial numbers in a whole egg-*Listeria* mixture. N<sub>2</sub> gas under similar experimental conditions did not kill the spiked bacteria in these 4 food systems. High pressure CO<sub>2</sub> treatment technique could possibly be applied to reduce microbial load in some food systems. AA

974

Chain (VS) and Fung (DYC). **Comparison of redigel, petrifilm, spiral plate system, isogrid, and aerobic plate count for determining the numbers of aerobic bacteria in selected foods.** *Journal of Food Protection* 54(3); 1991; 208-211

The numbers of aerobic bacteria from chicken, ground beef, ground pork, shelled pecan, raw milk, thyme, and flour (20 samples from each food) were determined by 4 alternative viable cell count methods (Redigel, Petrifilm, Spiral Plate System, and Isogrid) to ascertain the effectiveness of these methods in providing viable cell counts compared with the widely used Aerobic Plate Count (APC) method. The results indicated that all 5 methods were highly comparable ( $r = 0.97$  and higher, with the exception of Petrifilm versus Spiral Plate System, which was 0.88) and exhibited a high degree of accuracy and agreement. Thus, the 4 alternative methods were found to provide accurate aerobic bacterial counts of foods compared with the APC method. AA

975

Decallonne (J), Delmee (M), Wauthoz (P), El Lioui (M) and Lambert (R). **A rapid procedure for the identification of lactic acid bacteria based on the gas chromatographic analysis of the cellular fatty acids.** *Journal of Food Protection* 54(3); 1991; 217-224

This study was conducted to develop a rapid numerical procedure for the analysis of gas chromatograms of lactic acid bacteria fatty acid methylesters (FAMES), along with an examination of some experimental conditions which affect the fatty acid composition of these bacteria. FAME detn. was carried out using high resolution GC (HRGC). Although the nature and the proportion of fatty acids differed among strains, some major components, n-C14:0, n-C16:1, n-C16:0, n-C18:1, n-C18:0 and C19 cycl. were found as a group to represent more than 90% of the whole cellular fatty acids. The differences found in the relative composition of the long-chain fatty acids in paired chromatograms were used to calculate a "distance coefficient", based on the differences found for the most important fatty acids, after their prior ranking. The procedure was initially validated with identified species, used as reference strains; then, unknown lactic acid

bacteria isolates were compared to these references. The method proved to be useful for rapid comparisons between strains, provided a strict standardization occurred prior to routine application. AA

### *Listeria monocytogenes*

976

Smith (JL), Marmer (BS) and Benedict (RC). **Influence of growth temperature on injury and death of *Listeria monocytogenes* Scott A during a mild heat treatment.** *Journal of Food Protection* 54(3); 1991; 166-169

The growth temp. of *L. monocytogenes* has a profound effect on injury and death of washed cells that are suspended in phosphate buffer and exposed to 52°C for 1 h. The temp. of 52°C has low lethality for cells grown at 37 or 42°C, but there was a 10<sup>3</sup> - 10<sup>4</sup>-fold increase in killing for cells grown at 28, 19, 10 or 5°C. There was little injury with exposure to 52°C of cells grown at 5, 10 or 19°C, but injury increased as the temp. of growth increased. When cells were grown anaerobically, lethality induced at 52°C increased as the growth temp. decreased, but there was more injury under anaerobic conditions than for aerobically grown cells. The results indicate that *L. monocytogenes* cells growing at low temp. are more susceptible to heat induced death. AA

977

Wenzel (JM) and Marth (EH). **Behaviour of *Listeria monocytogenes* in the presence of lactic acid bacteria in an agitated medium with internal pH control.** *Journal of Food Protection* 54(3); 1991; 183-188

An agitated medium with internal pH control (IPCM-2) was inoculated to contain *L. monocytogenes* (strain V7, Scott A or California) at ca. 10<sup>3</sup> CFU/ml and *Streptococcus cremoris* (*Lactococcus lactis* subsp. *cremoris*) or *Streptococcus lactis* (*Lactococcus lactis* subsp. *lactis*) at 0.25 or 1.0%. The inoculated medium was incubated with shaking in a waterbath at 30°C for 30 h. *L. monocytogenes* and lactic acid bacteria were enumerated and pH was determined at appropriate intervals. The area on a figure between curves for the control and treatment and designated as the area of inhibition (AI) was calculated and used to quantify inhibition of each strain of *L. monocytogenes* for a particular set of conditions in IPCM-2. Statistical analysis of AI values calculated from data obtained at 6, 24 and 30 h of incubation revealed no significant ( $p < 0.05$ ) difference in inhibition among the 3 strains of *L. monocytogenes* for each type of lactic streptococcus present. *Streptococcus cremoris* was significantly ( $0.01 < p <$



0.05) more inhibitory to all 3 strains of *L. monocytogenes* than was *S. lactis* at 24 and 30 h of incubation. IPCM-2 is considered ready for use at a pH of 5.4 or less, which was reached between 12 and 15 h of incubation in samples containing 0.25 or 1.0% *S. cremoris*. Populations of *L. monocytogenes* in such samples were ca.  $10^4$  to  $10^6$  CFU/ml regardless of strain of *Listeria* or percentage of *S. cremoris* added as inoculum. In samples initially containing 0.25 or 1.0% *S. lactis*, pH 5.4 was not reached until after 18 - 24 h of incubation. At this point all 3 strains of *L. monocytogenes* had grown to ca.  $10^5$  CFU/ml regardless of percentage of *S. lactis* added as inoculum. Despite the inhibition seen, substantial numbers of the pathogen were present when the medium was ready for use. AA

978

McCarthy (S). **Attachement of *Listeria monocytogenes* to chitin and resistance to biocides.** *Food Technology* 46(12); 1992; 84-87

The effects of 3 sanitizers iodine, chlorine and quaternary ammonium compound on both suspended *L. monocytogenes* cells and cell attached to chitin flakes are described. The study confirms that attached cells are more resistant than suspended cells to disinfection and that older cultures are more resistant than younger cultures. CSA

## Fungi

### *Aspergillus parasiticus*

979

Janardhana Reddy (M), Shekara Shetty (H), Fanelli (C) and Lacey (J). **Role of seed lipids in *Aspergillus parasiticus* growth and aflatoxin production.** *Journal of the Science of Food and Agriculture* 59(2); 1992; 177-181

The seed lipids of groundnut (*Arachis hypogaea* L.), paddy (*Oryza sativa* L.), sorghum (*Sorghum bicolor* (L.) Moench), cowpea (*Vigna unguiculata* L. Walp) and green gram (*Vigna radiatus* L. Wilezek) were studied for their ability to support growth and aflatoxin B<sub>1</sub> (AFB<sub>1</sub>) production by *Asp. parasiticus* NRRL 2999. Results indicated that groundnut with the most lipids supported greatest AFB<sub>1</sub> production. All crops except for sorghum and paddy, powdered seed material (PSM) supported more AFB<sub>1</sub> production than their respective defatted PSM. Higher the amount of lipid content of seed or seed components, higher was the growth and AFB<sub>1</sub> biosynthesis. Seed lipids thus seem important in determining growth and AFB<sub>1</sub> production by *Asp. parasiticus*. BV

## Yeasts

980

Kanawjia (SK), Khanna (R) and Singh (S). **Yeast nucleoproteins - a bioproduct for food usage.** *Indian Dairyman* 44(12); 1992; 584-587

Reports modified engineering techniques to manufacture high quality and novel food products from yeast nucleoprotein. Preparation of yeast protein with low nucleic acid content, problems associated with yeast protein to make it acceptable, inexpensive, safe source of protein; functional properties of yeast nucleoprotein for food usage are discussed. GS

981

Seiler (H). **Some additional physiological characteristics for the identification of food-borne yeasts.** *Netherlands Milk and Dairy Journal* 45(6); 1992; 253-258

A total of 2664 yeasts were isolated from cheese brines, cheese, quarg, yoghurt, and fruit preparations. These were identified based upon a set of 67-71 characteristics routinely used in yeast identification. In addition, the reactions assimilation of D-lyxose, D-turanose, gentibiose, N-acetyl-D-glucosamine and D-arabitol were evaluated. These 5 characteristics yield clear reactions and are very species-specific, whereby they present themselves as further characteristics in yeast differentiation, especially for testing in microtitration plates. AA

## Hygiene

982

Smith (JL). **Foodborne toxoplasmosis.** *Journal of Food Safety* 12(1); 1991; 17-57

In this review, several aspects of *Toxoplasma gondii*, an obligate intracellular protozoan parasite which causes toxoplasmosis, a disease of mammals and birds, including its survival, its distribution in the environment (water, soil) and animals (coprophagous invertebrates, cattle, swine, sheep, goats, fowl, horses, wild and zoo animals, reptiles, dogs and cats), its presence and survival in foods (beef and veal, small game animals, fowl, horse meat, deer and elk meat, mutton, lamb and goat meat, pork, nonmeat foods), elimination of *T. gondii* from foods, detecting its antibody, its transmission to humans (ingestion of oocysts, ingestion of tissue cysts, prenatal transmission), and role of virulence factors (host-penetration factor, toxins, immunosuppression, resistance of phagocytosis, phospholipase, inhibition of fusion of



parasitrophorous vacuoles) are reviewed. In addition, human toxoplasmosis, its treatment and prevention, and the economic aspects of the disease (congenital toxoplasmosis, noncongenital toxoplasmosis and the impact on the food industry) are also discussed. 208 references. CSA

## BIOTECHNOLOGY

983

Patel (RK). **Biotechnology and dairying**. *Indian Dairyman* 45(1); 1993; 4-6

Reviews the application of biotechnology in dairy industry for the genetic improvement of animal breeds; use of animals as bioreactors to produce rare proteins; improved dairy starter cultures; dairy enzymes; accelerated cheese ripening; efficient whey utilization; and biological stabilization of dairy wastes. GS

984

Romero (DA). **Bacteria as potential sources of flavour metabolites**. *Food Technology* 46(11); 1992; 122, 124-126

The potential of bacteria to produce various flavour metabolites (diacetyl, alkylpyrazines, terpenes and aromatic compounds), precursors and enhancers as well as enzymes that can be used to produce flavour compounds is discussed in this article. CSA

985

Nagodawithana (T). **Yeast-derived flavours and flavour enhancers and their probable mode of action**. *Food Technology* 46(11); 1992; 138, 140-142, 144

This article discusses the production of yeast derived products, the development of improved yeast extracts (by autolysis, plasmolysis and hydrolysis), production of autolysates and flavour enhancers as well as the elucidation of the mechanisms of flavour perception, enhancement and synergism. CSA

986

Bigelis (R). **Flavour metabolites and enzymes from filamentous fungi**. *Food Technology* 46(11); 1992; 151, 154-156, 158, 161

The production of flavour metabolites (citric acid and gluconic acid) directly by fungal fermentation, isolation of enzymes (carbohydrases, nucleolytic enzymes, lipases and proteinases, enzymes that remove off-flavours, enzymes that extract flavour constituents) from filamentous fungal cultures and

their use to make flavour compounds, the role of filamentous fungi in influencing the flavour of fermented foods (cheese, oriental fermented foods, cured meat) are the aspects discussed in this article. The potential for application of genetically engineered filamentous fungi to the production of novel flavour peptides is also considered in brief. CSA

987

Reade (L). **The hard cell**. *Food Manufacture* 67(9); 1992; 37-38

Application of biotechnology in extending shelf-life, to improve food quality and protection of crops from the ravages of drought and sunlight is briefly discussed. SRA

988

Seshadri (CV) and Umesh (BV). **Spirulina - a nutritious food for the masses**. *Invention Intelligence* 28(8); 1992; 252-256

Discusses briefly large scale cultivation of *Spirulina* on specially designed ponds. The various steps involved in the production of *Spirulina* are shown in a flow chart. Also covered in this article are the composition (per 100 g) of *Spirulina* (protein 65 - 71%, fat 6.7%, crude fibre 9.3%, carbohydrates 16.0%, vitamins, minerals and essential amino acids) and uses. BV

## TISSUE CULTURE

Nil

## FOOD ADDITIVES

### Antibrowning agents

989

Radha Iyengar and McEvily (AJ). **Antibrowning agents: Alternatives to the use of sulphites in foods**. *Trends in Food Science and Technology* 3(3); 1992; 60-64

This review focuses on the recent advances in the study of anti-browning agents, with particular emphasis on their use in food industry (fruits, vegetables and beverages). Although sulphites are effective at inhibitory browning, adverse health effects associated with sulphite usage and increased regulatory scrutiny have created the need for substitutes. Anti-browning agents discussed are: reducing agents (ascorbic acid and ascorbyl

derivatives, sulphydryl compounds), chelating agents (EDTA, phosphate-based compounds - sodium acid phosphate, polyphosphate, metaphosphate and 'Sporix'), acidulants (citric acid, malic acid, tartaric acid, malonic acid, phosphoric acid, HCl), polyphenol oxidase (resorcinols, aromatic carboxylic acids, aliphatic alcohols, amino acids, peptides and proteins, anions, kojic acid), complexing agents (cyclodextrins, chitosan), enzyme treatments (ring-cleaving oxygenases, catechol transferase, protease) and combinations of anti-browning agents. 33 references. BV

## Colourants

990

Nayak (RR) and Kulkarni (PR). **The world of food colours.** *Beverage and Food World* 19(4); 1992: 31-34

Briefly discusses types of food colours (natural, synthetic), safety of food colours, legal aspects of food colours, newer sources of food colours, non-absorbable polymeric food colours and browning in foods. BV

## Flavourings

991

Werkhoff (P), Guntert (M) and Hopp (R). **Dihydro-1,3,5-dithiazines: Unusual flavour compounds with remarkable organoleptic properties.** *Food Reviews International* 8(3); 1992: 391-442

All alkyl-substituted and bicyclic 1,3,5-dithiazines identified in the flavour of foodstuffs and in model systems are discussed in this review. Also provides general description of the sensory properties of 1,3,5-dithiazines, reports on results and research developments in order to update information in the area of flavour compounds. 81 references. SRA

## CEREALS

992

Kochar (GK) and Sharma (KK). **Fibre content of common Indian food grains.** *Bulletin of Grain Technology* 29(2); 1991: 113-116

The chemical composition of fibre content in common 4 Indian cereals and 7 legumes and their products were determined. Neutral detergent fibre (NDF g/100g of DM) in cereal and whole legumes ranged from 2.85 (rice) to 12.50 (wheat), 3.50 (refined wheat flour) to 8.40 (wheat flour) and 13.00

(kidney beans) to 18.00 (chickpeas), 3.30 (blackgram washed) to 15.00 (dried peas) respectively. Refining and washing decreased NDF content. The importance of dietary fibre is emphasised because low fibre intake may cause ischaemic heart diseases, diabetes, diverticular diseases of colon, colon cancer and other gastrointestinal tract diseases. GS

## Paddy

993

Pillaiyar (P), Singaravadivel (K), Desikachar (HSR) and Subramanian (V). **Low-moisture parboiling of paddy.** *Journal of Food Science and Technology (India)* 30(2); 1993: 97-99

Soaking paddy at 70°C for 1 h, draining and tempering hot for 4 h, restricted the kernel moisture to about 25% (wb) with even distribution of moisture in core - a condition just enough to get a normal parboiled rice without white core. This paddy, on steaming at 0 kg/cm<sup>2</sup> for 10 min to gelatinize the starch, contained 26 - 27% (wb) moisture and resulted in 20 - 25% saving in drying time. Pre-steaming/high soaking temp./longer soaking period increased the grain moisture appreciably. AA

## MILLETS

### Corn

994

Osuji (GO) and Cuero (RG). **Regulation of ammonium ion salvage and enhancement of the storage protein contents of corn, sweet potato, and yam tuber by N-(carboxymethyl) chitosan application.** *Journal of Agricultural and Food Chemistry* 40(5); 1992: 724-734

The biochemical approach to storage protein enhancement via NH<sub>4</sub><sup>+</sup> ion metabolism was investigated by treatment of growing yam tuber, sweet potato, and corn with N-(carboxymethyl) chitosan (NCMC). Application of NCMC to yam gave rise to  $\alpha$ -ketoglutarate ( $\alpha$ KG)-dependent inhibition of the glutamate synthase (GOGAT) with an inhibition constant (K<sub>i</sub>) of 3 mM but relieved the  $\alpha$ KG-dependent inhibition of the glutamate dehydrogenase (GDH), with a concomitant 270% increase of the storage protein content. In sweet potato, NCMC application gave rise to glutamate-dependent inhibition of the glutamine synthetase (GS) with K<sub>i</sub> of 15 mM but relieved the inhibition of the GDH by high  $\alpha$ KG concn., with a concomitant doubling of the storage protein contents. In corn, NCMC application also gave rise to  $\alpha$ KG-dependent inhibition of the GOGAT with K<sub>i</sub>



to  $\alpha$ KG-dependent inhibition of the GOGAT with  $K_i$  of 0.5 mM but relieved the  $\alpha$ KG-dependent inhibition of the GDH, with a concomitant doubling of the storage protein content. NCMC treatment also reduced the levels of some of the high mol. wt. polypeptides (deaminating) while it increased the levels of some of the low mol. wt. polypeptides (aminating) of GDH. Therefore, NCMC enhanced the storage protein contents of the crops by enhancing  $\text{NH}_4^+$  ion salvage. AA

## Sorghums

995

Grimmer (HR), Parbhoo (V) and McGrath (RM). **Antimutagenicity of polyphenol-rich fractions from *Sorghum bicolor* grain.** *Journal of the Science of Food and Agriculture* 59(2); 1992; 251-256

Polyphenols extracted from a bird-resistant sorghum (*S. bicolor* (L) Moench) grain cv SSK 30 were separated into 3 crude fractions: non-tannin polyphenols with small  $M_r$  ( $F_1$ ); proanthocyanidins with  $M_r$  values between 2000 and 10000 ( $F_2$ ); and proanthocyanidins with much larger  $M_r$  values of around 10000 - 50000 ( $F_3$ ). Each fraction was tested for mutagenicity using mutants of *Salmonella typhimurium* (the Ames test) or the somatic mutation and recombination test (SMART) employing *Srosophila melanogaster*. None of the fractions was positive with either test. On the other hand the crude polyphenols all acted as antimutagens when coincubated with mutants of *S. typhimurium* and standard mutagens (sodiumazide, daunomycin and 2-aminofluorene). The order of antimutagenicity was  $F_3 > F_2 > F_1$ , a decrease with decreasing  $M_r$ . It is possible that a different mechanism of polyphenol antimutagenicity occurs against the mutagen sodium azide when compared with the mutagens daunomycin and 2-aminofluorene. AA

## Kisra

996

Ahmed (AM), Singh (B) and Singh (U). **Improvement of sensory and nutritional qualities of sorghum-based 'Kisra' by supplementation with groundnut.** *Journal of Food Science and Technology (India)* 30(2); 1993; 121-126

Studies were conducted to assess the feasibility of supplementation of sorghum flour with groundnut flour for *kisra* preparation. Flour samples of 4 sorghum cvs were supplemented with 0, 10, 15, 20, 25 and 30% of defatted groundnut flour, and *kisra* prepared was studied for sensory and nutritional qualities. The quality of sorghum flour *kisra* with groundnut flour upto 30% was found to be satisfactory and acceptable as judged by sensory

evaluation. Protein and lysine contents of *kisra* increased by 73% as a result of supplementation of sorghum with 30% groundnut flour. At this level of supplementation, the ratios of leucine to isoleucine and leucine to lysine were significantly decreased and *in vitro* protein digestibility of *kisra* increased. The results are of importance in improving the nutritional status of the diets of people in semi-arid tropical Africa. AA

## PULSES

997

Ashenafi (M). **Growth of *Listeria monocytogenes* in fermenting tempeh made of various beans and its inhibition by *Lactobacillus plantarum*.** *Food Microbiology* 8(4); 1991; 303-310

*L. monocytogenes* grew to a level of  $10^6$  cfu  $g^{-1}$  during fermentation of unacidified horsebean, pea, chickpea and soybean *tempeh*. Inoculation of unacidified beans with *Lactobacillus plantarum* resulted in a complete inhibition of *L. monocytogenes* in fermenting pea, chickpea and soybean *tempeh*. In fermenting horsebean *tempeh* only growth rate retardation was observed. Acidification of the beans during soaking did not show any marked inhibitory effect on the growth of *L. monocytogenes*. Inoculation of acidified cooked beans with *L. plantarum* resulted in a complete inhibition of *L. monocytogenes* in fermenting pea, chickpea and soybean *tempeh*. Only a decreasing *L. monocytogenes* growth rate was noted in fermenting horsebean *tempeh*. The complete or partial inhibition of *L. monocytogenes* is believed to be due to fall in pH, acid production and formation of other inhibitory substances by *L. plantarum*. Since growth of *L. plantarum* does not result in the marked difference in the sensory quality of the product, its use to control undesirable microorganisms may be considered during commercial *tempeh* production. AA

## Beans

998

Bonorden (WR) and Swanson (BG). **Thermal stability of black turtle soup bean (*Phaseolus vulgaris*) lectins.** *Journal of the Science of Food and Agriculture* 59(2); 1992; 245-250

A method for determining the thermal stability of porcine thyroglobulin (PTG)-binding lectins in whole black turtle soup beans (*Phaseolus vulgaris* L) is described. The procedure utilises PTG-Sepharose affinity chromatography and the Folin-Ciocalteu protein assay. The majority of lectin activity in whole black turtle soup beans was destroyed by



whereas unsoaked beans required 20 min of heat treatment at 97.8°C. Residual lectin activity was eliminated by thermally processing the presoaked and unsoaked beans for 25 and 50 min at 97.8°C, respectively. Thermal inactivation of the lectin in the whole seed is a biphasic, first-order reaction mechanism. Lectin-rat intestinal epithelial cell binding studies indicated the presence of a second lectin in the BTS albumin protein fraction. The lectin lacked an affinity for PTG and was inactivated by heating unsoaked whole beans for 50 min at 97.8°C. AA

## Blackgram

999

Sood (DR), Ram. T. and Dhindsa (KS). **Nutritional and cooking evaluation of blackgram (*Vigna mungo* (L.) Hepper).** *Bulletin of Grain Technology* 29(2); 1991; 99-103

Moisture, protein, methionine, cysteine, cystine, tryptophan, total phenols, Fe, energy, biological value, seed index, seed density, seed vol., hydration capacity, hydration index, swelling capacity, cooking time, pH and electrical conductivity of the solids dispersed in cooking water and water absorption after cooking were analysed for three strains of blackgram, UH 80-7, UH 80-4 and T<sub>9</sub>. The nutritional and cooking quality of T<sub>9</sub> strain was superior to others. GS

## Cowpeas

1000

Uzogara (SG), Morton (ID) and Daniel (JW). **Effect of water hardness on cooking characteristics of cowpea (*Vigna unguiculata* L. Walp) seeds.** *International Journal of Food Science and Technology* 27(1); 1992; 49-55

Cowpeas were cooked in water made hard (or soft) by the separate addition of similar concn. of certain salts (CaCl<sub>2</sub>, MgCl<sub>2</sub> or NaHCO<sub>3</sub>). The beans were also cooked in hard tap water and in double distilled water before and after soaking in water. Hard water caused a significant decrease in softness, led to reduced water absorption, and also decreased solids loss in the cooked product, but it increased the cooking time and discolouration of the beans. Hard water also gave rise to a significant ( $P < 0.05$ ) increase in mineral content, but it had less effect on the proximate composition of the cooked products. AA

## Fababeans

1001

Sharma (A) and Seghal (S). **Proximate composition and protein fractions of fababeans (*Vicia faba*).** *Bulletin of Grain Technology* 29(2); 1991; 104-107

Two var. of *Vicia faba*, VH-131 and WF (White flowered) were analysed for proximate composition and protein fractions. Protein, fat, crude fibre and ash content in VH-131 and WF were 28.65% and 29.22%, 2.15% and 1.80%, 8.8% and 9% and 2.9% and 3.43% respectively. Carbohydrate was more in VH-131. Globulin, albumin and glutenin fractions were 44.57 g and 49.88 g, approx. 14 g in both, 12.21 g and 10.76 g/100 g of protein in VH-131 and WF respectively. As typical of legumes, prolamines were min. and almost negligible. AA

## Mungbeans

1002

Galvez (FCF) and Resurreccion (AVA). **Reliability of the focus group technique in determining the quality characteristics of mungbean [*Vigna radiata* (L.) Wilczek] noodles.** *Journal of Sensory Studies* 7(4); 1992; 315-326

Five focus groups consistently identified list of desirable and undesirable characteristics of dry and cooked noodles. Results indicated that when consumer testing is not desired, focus group technique is a valuable tool. In dry starch noodles, colour, glossiness and transparency but in cooked noodles mouth-feel instead of colour, taste and odour are important. SD

## Peas

1003

Kandewade (VL) and Maharaj Narain. **Effect of pre-treatment and drying air temperature on quality of peas dehydrated in fluidized bed dryer.** *Journal of Food Science and Technology (India)* 30(2); 1993; 118-120

Data on pretreatments (pricking and blanching) and drying air temp. (60 - 90°C) on rehydration ratio and sensory characteristics of peas (Variety: 'Akrel') dehydrated in fluidized bed dryers showed that the effect of pricking was more prominent than blanching. Temp. also affected texture and flavour. Drying air temp. of 70 - 80°C with pricking and blanching were found to be the optimum treatments for pea dehydration in fluidized bed. AA



## Redgram

1004

Mulimani (VH) and Paramjyothi (S). **Proteinase inhibitors of redgram (*Cajanus cajan*)**. *Journal of the Science of Food and Agriculture* 59(2): 1992: 273-275

Proteinase inhibitory activity of 35 var. of redgram (*Cajanus cajan* L) was determined. Chymotrypsin inhibitory activity was more pronounced than trypsin inhibitory activity in all redgram var. tested. Both trypsin and chymotrypsin inhibitory activities were found to be markedly reduced on germination. AA

## OILSEEDS AND NUTS

1005

Sindhu Kanya (TC), Nagaraju (T) and Kantharaj Urs (M). **Glucosinolate and lipid composition of newer Indian varieties of mustard and rapeseed**. *Journal of Food Science and Technology (India)* 30(2): 1993: 137-138

Mustard var. contain 64.4 and 89.5  $\mu$  moles gluconapin/g dry meal in contrast to 104.2 and 123.3  $\mu$  moles/g dry meal in rapeseed var. Sinigrin was present only in mustard and amounted to 7.6 and 10.3  $\mu$  moles/g dry meal. Erucic acid was found to be rich in all the var. Iodine values were higher in mustard var. than in 4 var. of rapeseed. AA

## Canola

### Canola proteins

1006

Ismond (MAH) and Welsh (WD). **Application of new methodology to canola protein isolation**. *Food Chemistry* 45(2): 1992: 125-127

A new method, termed the protein micellar mass procedure is applied to isolate the undenatured canola protein, enhance the amount of protein isolated and eliminate the antinutritional factors. Among 6 different environmental regimes, the medium characterized by pH 5.5, 0.1 M NaCl/0.1 M  $\text{NaH}_2\text{PO}_4$  was found most suitable for removing antinutritional factors. SD

## Groundnuts

1007

Basha (SM). **Soluble sugar composition of peanut seed**. *Journal of Agricultural and Food Chemistry* 40(5): 1992: 780-783

To determine the soluble sugar composition of raw peanut (*Arachis hypogaea* L.) seed, sugars were extracted from defatted flours prepared from freeze-dried and cold-stored samples using 80% methanol and fractionated by HPLC. The results showed that except for Altika, all 20 peanut cvs examined contained primarily sucrose followed by glucosamine (tentative), stachyose, and raffinose. During sugar extraction, exposure of samples to heat alone did not cause oligosaccharide breakdown but exposure to acidic sol. increased oligosaccharide breakdown into glucose and fructose. In addition, short-term refrigerated or frozen storage appeared to cause no major changes in soluble sugar composition of peanut seed. Results of this study indicated that the soluble sugar constituents of peanut seed include primarily sucrose, glucosamine (tentative), raffinose, and stachyose and that other monosaccharides such as glucose and fructose arise as a result of oligosaccharide breakdown during the sample processing and analysis. AA

1008

Jambunathan (R), Gurtu (S), Raghunath (K), Seetha Kannan, Sridhar (R), Dwivedi (SL), Nigam (SN). **Chemical composition and protein quality of newly released groundnut (*Arachis hypogaea* L.) cultivars**. *Journal of the Science of Food and Agriculture* 59(2): 1992: 161-167

Five groundnut cvs developed by the ICRISAT, Patancheru, AP, India and 2 local cvs as controls grown in post-rainy and rainy seasons at Patancheru were analysed for their proximate composition, minerals and trace elements, amino acid composition, true protein digestibility (TD), biological value (BV), net protein utilization (NPU), protein efficiency ratio (PER). Groundnut cvs grown in the post-rainy season showed significantly higher values for protein content, 100-seed mass, Ca, K, Fe and TD than in the rainy season. Starch, sugars, Zn, Mn, BV and NPU were higher in the rainy season than in post-rainy season cvs. Post-rainy season cvs exhibited higher concn. of several essential and non-essential amino acids. BV

## Hanshi

1009

Longvah (T) and Deosthale (YG). **Chemical and nutritional studies on hanshi (*Perilla frutescens*), a traditional oilseed from Northeast India**. *Journal of the American Oil Chemist's Society* 68(10): 1991: 781-784

protein (17.0%) and fat (51.7%). The fatty acid profile indicated that perilla oil is rich in polyunsaturated fatty acids, such as linolenic (56.8%) and linoleic (17.6%). The amino acid composition showed that valine was the limiting amino acid of perilla protein. The PER of the seed protein (2.07) was lower than that of casein (2.99), but comparable to common oilseeds. True digestibility of the seed protein (82.6%) was also lower than that of casein (89.3%). AA

## Safflower seeds

### Safflower seed proteins

1010

Tasneem (R) and Prakash (V). **Effect of aqueous ethanol washing on the physicochemical and functional properties of safflower (*Carthamus tinctorius*) seed proteins.** *Journal of the Science of Food and Agriculture* 59(2): 1992; 237-244

Defatted safflower seed flour was deliganded by repeated extraction with 750 ml litre<sup>-1</sup> ethanol. This reduced the colour/ligand concn. to > 1% of the original concn. As a result of this the protein concn. increased from 585 to 686 g kg<sup>-1</sup> after deliganding. The proteins from the deliganded flour comprised 4 protein fractions, as observed from the gel filtration profile and sedimentation velocity pattern. However, the polyacrylamide gel electrophoretic pattern indicated 6 protein bands. Functional properties such as bulk density and water absorption capacity increased after deliganding. The fat absorption, emulsification and foaming properties showed a decreasing trend as a result of deliganding. AA

## Soybeans

1011

Snyder (JM), Mounts (TL) and Holloway (RK). **Volatiles from microwave-treated, stored soybeans.** *Journal of the American Oil Chemist's Society* 68(10): 1991; 744-747

Treatment of soybeans with microwave energy for 4-6 min is beneficial to the stability of oil and meal during soybean storage. Treatment of soybeans with microwave energy for 8-10 min can damage oil and meal. BV

1012

Kohyama (K), Yoshida (M) and Nishinari (K). **Rheological study on gelation of soybean 11S protein by glucono-δ-lactone.** *Journal of Agricultural and Food Chemistry* 40(5): 1992; 740-744

Dynamic viscoelasticity studies on gelation of soybean 11S protein by glucono-δ-lactone have been done to analyze the gelation process of *tofu*. Observed gelation curves at constant temp. were well approximated by first-order reaction kinetics. The saturated storage modulus depended mainly on the concn. of 11S protein. The saturated modulus was proportional to 3.4th power of 11S concn. The rate constant of the gelation increased with increasing gelling temp. and was mainly governed by the concn. of glucono-δ-lactone. The activation energy of the gelation was calculated to be  $1.5 \times 10^1$  kJ/mol from an Arrhenius plot of the rate constants. The latent time at which the shear modulus began to deviate from the baseline became shorter with increasing concn. of glucono-δ-lactone. However, the latent time was not shortened by an increase in protein concn., in contrast to previous findings for many other protein gels. AA

## Soy products

1013

Takano (Y), Furihata (K), Yamazaki (S), Okubo (A) and Toda (S). **Identification and composition of low molecular weight carbohydrates in commercial soybean oligosaccharide syrup.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 38(8): 1991; 681-683 (Ja)

Low mol. wt. carbohydrates have been preparatively isolated from the soybean oligosaccharide syrup by HPLC using two column systems. Ten carbohydrates including 6 galacto-oligosaccharides and one cyclitol were clearly identified by <sup>13</sup>C-NMR (500 MHz). Composition of carbohydrates was estimated by comparing peak area of the HPLC peaks: stachyose (21.9%), raffinose (5.8%), manninotriose (5.4%), melibiose (1.1%), galactopinitol A (2.6%), galactopinitol B (2.4%), sucrose (34.6%), glucose (7.2%), fructose (8.3%) and pinitol (5.5%). The content of the growth activator of bifidobacteria (stachyose, raffinose, manninotriose and melibiose) was about 34%. AA

## Shiro-shoyu

1014

Yamamoto (Y), Kakegawa (R), Takahashi (T), Higashi (K) and Yoshii (H). **Studies on making of shiro-shoyu. Part I. Utilization of soya lactic acid bacteria for shiro-shoyu making.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 38(8): 1991; 663-667 (Ja)



The utilization of soya lactic acid bacteria (*Pediococcus halophilus*) was investigated to improve the quality and colour of Shiro-shoyu (extremely light coloured soy sauce). The colour-lightening strains lowered the oxidation-reduction potentials of Shiro-shoyu moromi-juice (MJ) medium during their growth and suppressed the browning of the medium. A colour-lightening strain C-6-8 grew vigorously (viable cell of  $10^8$ /ml) in the Shiro-shoyu MJ medium. In the incubation at 21 - 30°C, the growth of strain C-6-8 slowed down with lowering temp., while at the lower temp. the period of fermentation were longer than that at the higher temp. In Shiro-shoyu moromi (mash) inoculated with strain C-6-8, lactic acid fermentation was continued about 2 wks at 22°C, and darkening phenomenon of moromi was suppressed during the fermentation. The contents of total N and L-glutamic acid of Shiro-shoyu made by inoculation of strain C-6-8 were slightly lower than that of non inoculated. However, production of a large quantity of lactic acid and acetic acid resulted low pH and high buffer action. These results suggested that the inoculation of soya lactic acid bacteria of Shiro-shoyu moromi were useful to improve the taste and colour of Shiro-shoyu. AA

#### Soy flour

1015

Jonnalagadda (SS), Sabharwal (P), Pratt (CA) and Barbeau (W). **The effect of dry heat on the bioavailability of iron in soy flour.** *Journal of the Association of Official Analytical Chemists* 68(12); 1991; 944-948

Bioavailability of Fe in soy flour was investigated by the Hemoglobin Regeneration Efficiency (HRE) procedure in 50 three-month-old Sprague-Dawley rats. Rats weighing 250 plus or minus 7 g and with a mean hemoglobin level of 12.9 g/dl were randomly assigned to one of 5 treatment groups: baseline (BL), unheated soy flour (UH), soy flour heated at 225°F for either 10 min (H10), 30 min (H30), or 120 min (H120). The animals were fed diets (46 p.p.m. Fe) containing soy flour for 21 days. HREs of UH, H10, H30 and H120 diets were 17.6, 16.8, 17.7 and 16.8% respectively. Apparent Fe absorption from the UH, H10, H30 and H120 diets was 94.7, 94.3, 93.9 and 94.3%, respectively. Serum Fe was significantly lower ( $p < 0.001$ ) and total Fe binding capacity was significantly higher ( $p < 0.001$ ) in rats fed the H120 diet. Fe concn. in the liver, spleen, heart and kidney were significantly lower in rats fed H30 or H120 diets. These results suggest that prolonged heating of soy flour may reduce Fe bioavailability and result in depletion in Fe stores. AA

#### Soy rabadi

1016

Grewal (RB) and Chauhan (BM). **Microbiological and available carbohydrate profile of soy rabadi - an indigenous fermented food.** *Indian Journal of Microbiology* 32(4); 1992; 457-461

Rabadi, an indigenous fermented food, was prepared from soybean. The grains were soaked, dehulled, autoclaved, mixed with curd prepared from skim milk powder and the mixture fermented at 25, 30 and 35°C for 12, 24 and 48 h. The microorganisms in the unfermented rabadi mixture comprised of lactobacilli, followed by yeast and coliforms at all the temp. Fungi were not detected. The pH decreased and titratable acidity increased as fermentation advanced. Total, reducing and non-reducing sugars as well as starch diminished with an increase in the period of fermentation at all the temp. Growth of lactobacilli depended on the total soluble sugar content and pH of the fermented product. AA

#### Tempeh

1017

Ashenafi (M) and Busse (M). **Growth of *Staphylococcus aureus* in fermenting tempeh made from various beans and its inhibition by *Lactobacillus plantarum*.** *International Journal of Food Science and Technology* 27(1); 1992; 81-86

In fermenting tempeh made from non-acid-soaked horsebean, pea, and soybean *Staphylococcus aureus* grew rapidly to a final count of  $10^8$  cfu.g<sup>-1</sup> or more, but growth was less when chickpea was used. Inoculation of the cooked beans with *Lb. plantarum* markedly decreased *S. aureus* growth rate and the final count in non-acid-soaked horsebean and pea tempeh, strongly retarded growth in chickpea-, and completely inhibited growth in soybean-tempeh. Acid soaking the beans resulted in lower *S. aureus* growth, and inoculation with *Lb. plantarum* completely inhibited it in soybean and reduced the counts in the other products to  $< 10^4$  cfu.g<sup>-1</sup>. Acidity, pH and other substances produced by *Lb. plantarum* are believed to inhibit *S. aureus* in fermenting tempeh. Inoculation of beans with *Lb. plantarum* may be used to control *S. aureus* growth and enterotoxin production during commercial scale tempeh production. AA

Bargale (PC) and Krishna Jha. **Changes in the instrumental texture profile of pasteurised tofu (soy paneer) during storage.** *Indian Journal of Dairy Science* 45(8): 1992: 429-431

Pasteurised *tofu* during storage revealed that an increase in the storage period some of the textural parameters like hardness, chewiness and gumminess increased significantly and springiness and cohesiveness remained unchanged. The prediction equations developed could be used for prediction of these parameters at desired period of storage. SRA

1019

Tuitemwong (K) and Fung (DYC). **Microbiological study of *tofu*.** *Journal of Food Protection* 54(3): 1991: 212-216

The microbiological qualities of *tofu* juice and cake were studied. 7 brands of *tofu* from 4 grocery stores were tested, at day 1 and after 30 days of storage in a refrigerator. The microbial load at day 1 was different from brand to brand, but cell counts in juice and cake of the same brand were correlated. The number of cells observed at day 30 was different from brand to brand but was related to the initial cell count. The pH had a great effect on the type of contaminating microorganisms present. All brands spoiled after 30 days of storage at 7°C; 112 isolates from both the fresh juice and cake at day 1 and at day 30 were obtained. The most common gram-positive organisms isolated were *Streptococcus* sp., *Pedococcus* sp., and *Lactobacillus* sp., and the most common gram-negative bacteria were *Pseudomonas putida*, *P. aeruginosa* *Enterobacter agglomerans* and *E. cloacae*. AA

## TUBERS AND VEGETABLES

### Carrots

1020

Sood (DR), Tek Ram, Dhindsa (KS) and Partap (PS). **Carbohydrates and pigment assays in forty one genotypes of carrot (*Daucus carota* L).** *Journal of Food Science and Technology (India)* 30(2): 1993: 145-147

Considerable variation has been observed in total solids, edible part, moisture, total sugars, reducing sugars, non-reducing sugars, total fructose, total carotenoids, anthocyanins, xanthophyll and lycopene contents in 41 carrot genotypes. AA

### Cassava

### Cassava starch

1021

Nellalah (H) and Gunasekaran (P). **Ethanol production from cassava starch hydrolysate by immobilized *Zymomonas mobilis*.** *Indian Journal of Microbiology* 32(4): 1992: 435-442

Batch fermentations of cassava starch hydrolysate (CSH, 150 g/l reducing sugars) by immobilized cells of *Z. mobilis* showed that a max. ethanol concn. of 59 g/l and productivity of 3.57 g/l/h could be obtained in 20 h while the final ethanol concn. obtained with free cells was 66 g/l with a productivity of 2.75 g/l/h in 24 h. Semi-continuous fermentation of CSH using immobilized cells reduced the fermentation time from 20 h to 12 h with an increased volumetric productivity of ethanol from 2.95 to about 4.85 g/l/h. The immobilized cells were stable for 7 cycles. Continuous production of ethanol using immobilized cells in packed-bed reactor at a flow rate of 59/ml resulted in the production of 51.6 g/l of ethanol with a volumetric productivity of 77 g/l/h for a period of 30 days. GS

### Taro

1022

Maga (JA). **Taro: Composition and food uses.** *Food Reviews International* 8(3): 1992: 443-473

The history, nomenclature, composition (proximate composition, protein/amino acid composition, lipids/fatty acids, starch, sugars, minerals, vitamins, organic acids, pigments, sterols, enzymes, acidity) of taro, compositional changes associated with taro production/processing/preparation, flavour properties, taro browning and crystalline taro, aflatoxin potential, food uses (poi, dehydrated taro chips, extruded taro) are reviewed based on scientific literature. 69 references. SRA

### Tubers

### Potatoes

1023

Reddy (GV) and Das (H). **Kinetics of deep-fat-frying of potato and optimization of process variables.** *Journal of Food Science and Technology (India)* 30(2): 1993: 105-108

Effects of deep-fat-frying time, temp. and thickness of potato slices on oil absorption, moisture content and colour of chips have been studied. The loss of reducing sugars was found to have an average



and colour of chips have been studied. The loss of reducing sugars was found to have an average diffusivity of  $5.06 \times 10^{-9} \text{ m}^2/\text{s}$  in case of blanching of 1.5 and 2 mm thick slices in boiling water. Colour development followed first order reaction kinetics with a  $Q_{10}$  value of 1.39 and 52.27 kJ/kg mole activation energy. Multiple regression equations were developed for moisture, oil and colour values in the final product as a function of frying time, oil temp. and thickness of slice. Use of linear programming technique yielded 220 - 222 sec frying time., 145 - 146°C oil temp. and 2 mm thickness of slice as optimum parameters. AA

## Sweet potatoes

1024

Ma (S), Silva (JL), Hearnberger (JO) and Garner (JO Jr). **Prevention of enzymatic darkening in frozen sweet potatoes (*Ipomoea batatas* (L.) Lam.) by water blanching: Relationship among darkening, phenols, and polyphenol oxidase activity.** *Journal of Agricultural and Food Chemistry* 40(5): 1992: 864-867

Enzymatic darkening in sweet potato (*Ipomoea batatas* (L.) Lam.) is a result of phenol oxidation catalyzed by polyphenol oxidase (PPO). Water blanching prevents darkening in frozen sweet potatoes by significantly decreasing the PPO activity but does not reduce phenol levels. The effect of curing on darkening was indirect and cv dependent. Compared to Centennial, the cv Jewel contained lower phenols but higher PPO activity. Generally, a blanch treatment at 100°C for 3 min or at 94°C for 5 min is required to produce products with minimal darkening. The results suggest that the phenol concn. should be used as an indicator for the potential enzymatic darkening in green sweet potatoes, whereas the residual PPO activity is a better predictor of darkening in the blanched or processed products. AA

## Vegetables

1025

Wu (Y), Perry (AK) and Klein (BP). **Vitamin C and  $\beta$ -carotene in fresh and frozen green beans and broccoli in a simulated system.** *Journal of Food Quality* 15(2): 1992: 87-96

Ascorbic acid (AA) in green beans decreased during refrigerated storage and in broccoli significantly increased for upto 7 days. Approx. 40% of AA loss was found in broccoli due to blanching. AA of fresh-frozen green beans stored at -20°C for 16 wks was about twice that in retail fresh market samples while that of broccoli was only half.  $\beta$ -carotene content of green beans and broccoli did not change

during either the retail market simulation of frozen storage and did not differ from that of fresh. SD

## Broccoli

1026

Hansen (M), Buttery (RG), Stern (DJ), Cantwell (MI) and Ling (LC). **Broccoli storage under low-oxygen atmosphere: Identification of higher boiling volatiles.** *Journal of Agricultural and Food Chemistry* 40(5): 1992: 850-852

Volatiles were isolated from broccoli stored under controlled atm. containing different levels of  $\text{N}_2$ ,  $\text{O}_2$ , and  $\text{CO}_2$ . The volatiles were analyzed by capillary GLC and MS. The presence of the previously identified methanethiol, ethanol, ethyl acetate, and dimethyl disulphide in low oxygen stored broccoli was confirmed. Additional compounds, identified in the present work, increasing under these low oxygen conditions included 3-hydroxybutan-2-one, methyl thiocyanate, hexanal, (E)-2-hexenal, 3-methylbutanol, dimethyl trisulphide, and 21 other compounds. Major compounds include methanethional, ethanol, ethyl acetate, 3-hydroxybutan-2-one, and methyl thiocyanate. The combination of threshold and concn. data indicated that the major contributors to the odour of the objectionable samples included methanethiol, dimethyl trisulphide, and  $\beta$ -ionone. AA

## Tomatoes

1027

Thiagu (R), Onwuzulu (OC) and Ramana (KVR). **A non-destructive measurement of pigments of whole tomato by light reflectance technique.** *Journal of Food Science and Technology (India)* 30(2): 1993: 92-96

A simple non-destructive method for estimating pigment content of tomato during ripening is described. Tomatoes sorted out subjectively into 6 ripening stages, from mature-green to over-ripe, were subjected to light reflectance measurements using a tristimulus photovoltaic colour instrument and also analysed for lycopene, chlorophyll and  $\beta$ -carotene contents. Simple linear coeff. of correlations between pigment values and 10 reflectance parameters viz., lightness (L), redness (a), yellowness (b), hue (a/b), hue angle  $\{\theta = \tan^{-1}(b/a)\}$ , chroma ( $\Delta C$ ), total colour difference ( $\Delta E$ ),  $a/L$ , arc length  $\{\theta \cdot \text{sqr}(a^2 + b^2)\}$  and tomato colour ( $2000^\circ \text{Cos}\theta/L$ ) were determined and suitable regression equations fitted to estimate lycopene, chlorophyll and  $\beta$ -carotene contents of tomatoes, using the best linear/non-linear function. AA



Kalra (R) and Nirankar Nath. **Effect of variety on morphological and physico-chemical characteristics of tomatoes.** *Beverage and Food World* 19(4); 1992: 26-27

Suitability of 5 commercial tomato var. (Pant Bahar, Pusa Ruby, Pant T-3, Pant T-4 and Pant T-5) were studied for processing. All the var. showed symmetrical shape with visible differences in their surface colour and appearance; their wt., vol., dia., sp. gr. and flesh thickness differed significantly. Pant Bahar and Pant T-5 gave highest juice yields of 81.3 and 83.0% respectively, sp. gr. of whole fruits was close to that of its juice. TSS was 4.1% in Pusa Ruby and 4.5% in Pant Tt-5. Pusa Ruby contained max. lycopene (1.74 mg/100 g), ascorbic acid 22.50 mg/100 g) and protein (0.34%). This study shows that var. Pusa Ruby and Pant T-5 were overall superior to other var. for processing due to their higher TSS, better colour and good juice yield. BV

## FRUITS

### Artichokes

1029

Rodrigo (M), Garcia (MG), Ramirez (L), Martinez (A), Giner (V), Safon (J). **Physical texture as an indicator of processing conditions for canning low-acid artichoke hearts.** *International Journal of Food Science and Technology* 27(1); 1992: 41-48

Kramer shear cell measures of texture of artichoke hearts were used to establish thermal loss parameters. A  $D_{121} = 25.5$  min and a  $z = 27^{\circ}\text{C}$  for texture were obtained, with a high correlation between texture and treatment time. Max. conservation of texture, in canned low-acid artichoke hearts in 0.5 kg cans (71.5 x 117 mm) whilst still ensuring microbiological stability, was obtained by heating at  $121^{\circ}\text{C}$  for 15 min. AA

### Bananas

1030

Thomas (P) and Janave (MT). **Effect of temperature on chlorophyllase activity, chlorophyll degradation and carotenoids of Cavendish bananas during ripening.** *International Journal of Food Science and Technology* 27(1); 1992: 57-63

Changes in chlorophyllase activity, chlorophyll and carotenoid content of Giant Cavendish banana fruit peel during ripening were measured at tropical temp. ( $30 - 34^{\circ}\text{C}$ ) and at  $20^{\circ}\text{C}$  to relate them to the greenish and yellow colours of the fruit ripened at these temp. At  $30 - 34^{\circ}\text{C}$  bananas remained green

on ripening due to incomplete chlorophyll degradation while at  $20^{\circ}\text{C}$  complete degreening occurred and fruits turned yellow. Peel total carotenoid content remained constant during ripening and did not change with temp. Free xanthophylls decreased while xanthophyll esters increased on ripening. Chlorophyllase activity increased during ripening and paralleled the respiratory climacteric, although activity was not consistently related to the differential degradation of chlorophyll at these temp. Exogenous application of ethylene and ethrel accelerated ripening, but had no effect on chlorophyllase levels, chlorophyll degradation and carotenoid content of bananas ripened at either  $30 - 34^{\circ}\text{C}$  or at  $20^{\circ}\text{C}$ . AA

### Guava

1031

Chyau (C-C), Chen (S-Y) and Wu (C-M). **Differences of volatile and nonvolatile constituents between mature and ripe guava (*Psidium guajava* Linn) fruits.** *Journal of Agricultural and Food Chemistry* 40(5); 1992: 846-849

During the ripening of guava fruits, the contents of total pectin, total sugars, reducing sugars, and acidity dropped obviously from the mature to the ripe stage, but the Brix-acid ratio increased inversely. Volatile constituents of mature and ripe guava fruits were identified by GC, GC/MS, and GC/FT-IR. A total of 34 components were identified, in which 17 components were further identified by authentic compounds. In quantitative distribution, total amounts of 134 mg/kg of mature fruit and 93 mg/kg of ripe fruit were determined. The major constituents in mature fruit were 1,8-cineole, (E)-2-hexenal, and (E)-3-hexenal. Ethyl hexanoate and (Z)-3-hexenyl acetate were the major volatile components of ripe fruit. AA

### Luffa tuberosa

1032

Kulkarni (CY), Bharathi (P) and Patil (CV). **Antimicrobial activity of *Luffa tuberosa* (Roxb).** *Indian Journal of Microbiology* 32(4); 1992: 493-495

*L. tuberosa* (Karchikai), a bitter fruit, 2-4 cm in length, was analysed for its antimicrobial activity which was due to the presence of natural glycoside like saponin. Processing improved the antimicrobial activity of the fresh fruit or the extracts. Roasting with oil increased the inhibition. The presence of saponin was established by the heavy foam formation (75 ml/100 g fruit or 25 ml fruit juice). GS



## Mangoes

1033

Awasthi (MD). **Decontamination of insecticide residues on mango by washing and peeling.** *Journal of Food Science and Technology (India)* 30(2); 1993; 132-133

The insecticide residues on mango fruits, resulting from plant protection sprays, were reduced to 66 - 68% for dimethoate and fenthion as against 21 - 27% for fenvalerate and cypermethrin simply by washing treatment. The peeling-off the fruit pericarp was found to dislodge 100% residues in all the cases. AA

1034

Khurdiya (DS). **Composition and quality of nectar prepared from blended pulps of Amrapali and Totapuri mangoes.** *Journal of Food Science and Technology (India)* 30(2); 1993; 139-140

Nectar prepared from the pulps of *Totapuri* and *Amrapali* at the ratio of 50:50, was superior in objective colour, carotenoid contents, viscosity and sensory quality, to the nectars prepared from either *Totapuri* pulp alone or the blend with *Amrapali* in the ratio of 75:25. AA

## Peaches

1035

Gonzalez (AR), Mauromoustakos (A), Prokakis (G) and Aselage (J). **Influence of year, cultivar and fruit maturity on quality of peach puree.** *Journal of Food Quality* 15(2); 1992; 97-109

A 3 yr study showed that pH and soluble solid/acid ratio increased while acidity and hue angle decreased and soluble solid had small or no increase as the first reached advanced stages of maturity. All these parameters fitted in linear regression accounted for 95% of the variability for maturity and cv. The results indicated that fruit maturity had strong relative importance than yr and cv. SD

1036

Vergano (PJ), Testin (RF), Choudhari (AC) and Newall (WCJr). **Peach vibration bruising: The effect of paper and plastic films between peaches.** *Journal of Food Quality* 15(3); 1992; 183-197

Kinetic coeff. of friction (KCOF) values for peaches (cv. Candor, Rio-Oso-Gem, Redhaven, Jefferson and Sun Prince) were determined by using a modification of ASTM D 1894. The hypothesis show that the amount of vibration bruising is proportional to KCOF of peaches in contact with packaging material

tested. Lower KCOF values only corresponded to less bruising. The KCOF values were 0.7 for peach-to-peach; 0.4 for peach-to-paper and 0.2 for peach-to-polypropylene contacts. KCOF values were independent of cv. and maturity. KCOF value for peach-to-polypropylene contact was found to be a function of antiblock additives in the particular film used. SD

## CONFECTIONERY, STARCH AND SUGAR

### Sugars

1037

Wilson (J). **Brewing sugars: The versatile adjuncts.** *Food Manufacture* 67(9); 1992; 30-32, 34

Review covers the manufacturing processes, carbohydrates, fermentation rates, the advantages, high gravity brewing, increasing fermentable sugar, low alcohol beers, demineralised syrups, speciality brewing sugars and caramel colours. 15 references. SRA

## BAKERY PRODUCTS

1038

Hemantha Kumar (NG), Chengappa (PG) and Gaur (MK). **Pattern of expenditure and opinion of consumers on bakery products.** *Indian Baker* 23(1); 1992; 13-15

A consumer survey on bakery products with 75 families belonging to different monthly income level upto Rs 5000 and above indicated that on an av. 6.5% of their income was spent on bakery products preferring them for their nutritional and convenience aspects. SD

1039

Hemanta Kumar (NG), Chengappa (PG) and Ravi (PC). **Investment and resource use efficiency in bakery production.** *Indian Baker* 23(1); 1992; 18-21

Biscuit, cake, bun and bread bring the highest net returns and the investment in bakery is worthwhile. Raw material cost, labour and depreciation influence the level of bakery production. Use of electric ovens compared to fire wood ovens can be regulated for higher fuel efficiency in large bakeries. SD

Arya (SS). **Convenience foods - emerging scenario.** *Indian Food Industry* 11(4): 1992; 31-41

The paper emphasises the factors governing the quality and the technological constraints encountered in large scale production and marketing of convenience foods such as shelf stable fried products (*Shakarparas* and *namkeen*: fried products from Bengal gram; fried products from rice and legumes - *chakli*, *murukku*, *tengolal*, *muchorai* and *kodbale*; fried dhals); most fried products (*somosha*, *cutlets*, *vada*, *pakora*, *kachori*, *bhaji*); popped or puffed cereals (*kheel*, *khaj*, *aralu*, *nelpuri*); expanded cereals (*murmura*, *puri*, *muri*); beaten rice (*poha*, *avalakki*, *Chivda*); extruded foods (extruded pellets, ready-to-eat expanded products, corn and tortilla chips); fermented products (*idli*, *dosai*); traditional sweets (*chikki*, *gajjak*, *laddu*, *boondi*, *jilebi* *imarti* and *jhangiri*); papads; instant mixes based on chemical leavening (*gulab jamun*, cake, pancake, *dosai*, *idli*); instant mixes based on precooked dehydrated products (*pulav*, *khichdi*, *bisibelebhat*, curried dhal, rice, peas, curried *chholay*, *sambhar*, *rasam*, *dalia*, *rawa idli*, *halwa* and *upma* mixes); ready-to-eat products stabilised by antimycotic agents (*chapati*, *parotha* and *poori*); retort pouch foods (stuffed *parothas*); canned convenience foods; breakfast cereals (*dalia*, rolled oats, cereal flakes); fruit and vegetable based convenience foods. CSA

1041

Bhupinder Singh, Amarkeet Kaur, Minhas (KS) and Sidhu (JS). **Role of milk and products in bakery goods.** *Beverage and Food World* 19(4): 1992; 15-16

Milk products incorporation in bakery formulas significantly enhances flavour, aroma, eating quality and nutritional values, in addition to improving water absorption, dough strength, crust colour, tenderness, loaf vol., internal crumb characteristics, and shelf-life of bakery products. Milk solids significantly improve the protein quality of bakery goods by supplying lysine and tryptophan essential amino acids. Milk products also improve vital mineral content of bakery goods. The following aspects are included: types of milk and milk products, role of milk, role of non-fat dry milk, whey products, role of whey and whey components, role of butter milk powder and butter fat. BV

## Bread

1042

Srivastava (AK) and Haridas Roe. **Effect of using different sources of milk products on the quality of bread.** *Journal of Food Science and Technology (India)* 30(2): 1993; 109-113

Studies were carried out to determine the effect of different milk products, such as skimmed milk powder, whole milk powder, whole milk and condensed milk on the quality of bread. All these milk products, in general, reduced the farinograph water absorption, increased the farinograph dough stability and made the dough more stiff. Incorporation of any type of milk product at 6.0% level (on dry basis) lowered the loaf vol. by 4.8 to 12.4%, hardened the texture, and made the grain coarser. The quality of milk bread could be improved by using 7.5% sugar, 4.0% fat and either a mixture of 15 p.p.m. potassium bromate and 100 p.p.m. ascorbic acid, or 0.5% of di-acetyl tartaric acid ester of monoglyceride along with 100 p.p.m. ascorbic acid. The above formulation improved the loaf vol. (445 to 559 cc) and crumb texture of the milk bread. The studies indicated that sterilized whole milk, which is less expensive than the dried or condensed milk, could be effectively used in milk bread formulation. AA

1043

Sidhu (JS), Bajaj (M), Kaur (A) and Singh (B). **Studies on the development of variety bread formulations.** *Bulletin of Grain Technology* 29(2): 1991; 93-98

The technology for the production of a few speciality breads like low-sodium breads, high fibre breads, sunflower kernal breads using different types of ingredients was developed. The breads showed desirable sensory characteristics, and superior nutritional quality with respect to protein, fat, ash, fibre and mineral content. GS

1044

Balakrishnan (N). **Soft bread from hard wheat.** *Indian Baker* 23(1): 1992; 27-29

Consumer seeks softness in bread as an index of freshness. The author reviews the part played by the factors such as hardness and composition of wheat, milling, incorporation of additives, improvers, enzymes, chemicals, flour quality and composition, dough quality, mixing, baking, wrapping and storage. SD

1045

Sinha (LK), Singh (G) and Ponte (GJ). **Baking and nutritional characteristics of soy-fortified bread.** *Indian Baker* 23(1): 1992; 31-34

Soy flour addition increased mixing tolerance index, water absorption but decreased the dough stability and mixing time. Increased level of fortification decreased specific vol. baking characteristics but



increased load value (textural analysis) which could be improved by addition of sodium steryl-2. Soy fortification at 12% produced acceptable and nutritionally improved bread. SD

## Doughs

1046

Venkateswara Rao (G) and Haridas Rao (P). **Methods for determining rheological characteristics of doughs: A critical evaluation.** *Journal of Food Science and Technology (India)* 30(2): 1993; 77-87

Rheological characteristics of doughs are of vital importance to bakery industry in predicting processing characteristics of dough and the quality of the end products. These also play a role in quality control programme and establishment of specifications for ingredients and the final products. Consequently, the reliability of the methods used for determining the rheological characteristics of dough assume vital importance. These methods are, therefore, critically analyzed and their limitations are pin-pointed. Use of computerized instruments is advantageous for more accurate, rapid and reproducible calculations of the curve parameters. AA

## Nan

1047

Rahim (A), Vatsala (CN) and Shrupalekar (SR). **Development of a laboratory method for preparation of Nan.** *Journal of Food Science and Technology (India)* 30(2): 1993; 114-117

A lab. method for preparation of an Indian traditional fermented food - nan has been developed, based on a questionnaire survey and evaluation of the dough and the nan from hotels. Research water absorption meter (RWAM) has been adapted for determining nan dough water absorption (NWA) to arrive at the desired dough consistency, expressed as the dough extrusion time in the range of 65 - 76 sec. Conditions have been optimised for (i) preparation of the dough based on refined wheat flour (*malda*), curd/yoghurt, milk, table salt, egg, fat, sugar, food grade sodium bicarbonate and water equivalent to NWA, (ii) fermentation and sheeting of the dough and (iii) baking of nan in a gas tandoor (oven). AA

## Pasta

1048

Glass (KA) and Doyle (MP). **Relationship between water activity of fresh pasta and toxin production**

**by proteolytic *Clostridium botulinum*.** *Journal of Food Protection* 54(3): 1991; 162-165

Four types of fresh pasta (meat- or cheese-filled tortellini and flat noodle linguine or fettucine) were prepared with different  $a_w$ , inoculated with proteolytic *Clostridium botulinum* spores, packaged under a modified atm., and stored at either 4 or 30°C for 8 to 10 wks. Products were assayed for botulinal toxin at appropriate sampling times. No toxin was detected in any fresh pasta held at 4°C for up to 8 wks. However, toxin was detected in meat tortellini with  $a_w$  of 0.99 and 0.95 at 2 and 6 wks, respectively, when held at 30°C. Toxin was not detected in meat tortellini with an  $a_w$  of 0.94 or below held at 30°C for 10 wks. Toxin was produced at 2 wks in linguine at  $a_w$  0.96 and held at 30°C, whereas no linguine or fettucine at  $a_w$  0.93 or 0.95 and held at 30°C was toxic during 10 or 8 wks, respectively. The  $a_w$  of fresh pasta is a principal factor in preventing botulinal toxin production by proteolytic *C. botulinum* in temp.-abused products. A survey of commercially available fresh pasta revealed that most flat noodles were below the  $a_w$  limit for botulinal toxin production, whereas most of the filled pasta had  $a_w$  values which permitted toxin production if temp. abuse occurred. AA

## MILK AND DAIRY PRODUCTS

1049

Sarkar (S) and Misra (SK). **Automated instrumentation for rapid quality assessment by the dairy industry.** *Indian Dairyman* 44(10): 1992; 477-484

Reports several automatic and semi-automatic instruments for quick and correct analysis and quality control of milk and milk products, since the conventional methods for examining raw milk are time consuming and laborious. The instruments are stomacher, automated pipettes and dilutors, automated plater, streaker and inoculator, colony counters and dynastainer. The new methods used today in the dairy industry are electrical methods, microscopic methods and quantitative methods such as Deft method, Bactoscan method, ATPase method, turbidimetric method, Limulus Lysate method, ELISA technique and infrared spectroscopic method. For bacteriological analysis of raw milk, the ATP-F test was the most rapid one. GS

1050

Patel (AA) and Prasad (SR). **Removal of radioactive contaminants from milk.** *Indian Dairyman* 44(12): 1992; 572-577



Processing of milk contaminated with radioactive isotopes such as strontium-89 and -90, iodine-131 and caesium-134 and -137, and methods of prevention and decontamination such as ageing, partitioning, treatment with ion exchangers; electrodialysis and the ultrafiltration are discussed. GS

1051

Arvind Raman and Jain (KK). **Dairying potential in Jalandhar district of Punjab.** *Indian Dairyman* 44(12); 1992: 578-583

1052

Shahani (KM). **Biotechnological applications in the dairy industry.** *Indian Dairyman* 45(1); 1993: 7-12

Principles of artificial insemination; growing of better fodder crops by selection of seed stocks; selection and growth of better cultures for the production of dahi and cheese; and advances in embryo transfer technology in the dairy industry are discussed. GS

1053

Cotton (LN) and White (CH). ***Listeria monocytogenes*, *Yersinia enterocolitica*, and *Salmonella* in dairy plant environments.** *Journal of Dairy Science* 75(1); 1992: 51-57

In order to determine the presence of the 3 environmental pathogens in dairy plants, 6 milk and 4 ice cream plants in a three state area were sampled. A total of 353 environmental samples were taken over 3 replications. Bacterial counts were performed on the environmental samples for chi-square analysis. *Salmonella* spp. were not isolated from any of the environmental samples. *L. monocytogenes* was isolated from 6.5% of the environmental samples. *Listeria* spp. other than *L. monocytogenes* were isolated from 9.3% of the environmental samples. The presence of *Y. enterocolitica* was significantly related to high bacterial counts for 6 microbiological tests. The presence of *L. monocytogenes* was not related to high bacterial counts. AA

1054

Shirai (K), Gutierrez-Duran (M), Marshall (VMF), Revoh-Moiseev (S) and Garcia-Garibay (M). **Production of a yoghurt-like product from plant foodstuffs and whey, sensory evaluation and physical attributes.** *Journal of the Science of Food and Agriculture* 59(2); 1992: 205-210

A mixed substrate composed of soya milk, oat flour and dried cheese whey (820, 110 and 70 g kg<sup>-1</sup>

respectively) was heat treated (80°C, 20 min) and fermented using 2 different yoghurt starters. Sensory evaluation was conducted in order to get the basic flavour profile and to assess the acceptability of the product. Unfermented mixed substrate and fermented milk were used as references. Two yoghurt starter combinations were used. Some additives such as sugar and Ca were also assessed. The addition of an equal wt. of milk to the mixed substrate, and flavours such as strawberry jam or honey, were tried as well. Acceptability of the mixed substrate was increased by fermentation and added sugar, milk and/or flavours. A suitable combination of strains was very important to get good acceptability of the fermented product. Colour and syneresis were also evaluated. Heat treatment had very little influence on the colour of the mixed substrate. The mixture was less white and a little less green than milk. Syneresis was lower than that of a yoghurt made from milk with 145 g litre<sup>-1</sup> total solids. AA

1055

Shirai (K), Pedraza (G), Gutierrez-Duran (M), Marshall (VME), Revah-Moiseev (S), Garcia-Garibay (M). **Production of a yoghurt-like product from plant foodstuffs and whey. Substrate preparations and fermentation.** *Journal of the Science of Food and Agriculture* 59(2); 1992: 199-204

A mixed substrate composed of soya milk, oat flour and dried cheese whey (82, 11 and 7% respectively) had a content of lactose and protein similar to that of milk used for yoghurt manufacture. Heat treatment for 20 min at 80°C resulted in a viscosity similar to that of yoghurt whilst removing coliform and mesophilic aerobic bacteria, moulds and yeasts. Fermentation with traditional yoghurt bacteria did not increase viscosity further, and the final product had similar acidity and texture to yoghurt. Acid development, carbohydrate consumption, proteolysis and starters counts were followed during fermentation. The fermentation profile of the mixed substrate was very similar to that of milk. AA

## MILK

1056

Kansal (VK). **Lactose in human health.** *Indian Dairyman* 44(10); 1992: 497-500

Lactose, the milk sugar is important in infant nutrition as a source of energy. It helps Ca absorption by small intestine and promotes the mineral utilization. It is useful as a therapeutic/dietetic sugar and promoter of the growth of acidophilic bacteria. In the event of metabolic diseases caused by lactose intolerance



and the metabolic disorders of galactose (galactosaemia), diet should be free of lactose. GS

1057

Vijayendra (SVN) and Gupta (RC). **Therapeutic importance of bifidobacteria and Lactobacillus acidophilus in fermented milks.** *Indian Dairyman* 44(12); 1992: 595-599

Reports the use of the intestinal strains (*Bifidobacterium* and *L. acidophilus*) in the preparation of fermented milk products like dahi, yoghurt and lassi and their beneficial role with respect to antimicrobial activity, anticarcinogenic activity, anticholesterolemic effect, alleviation of lactose intolerance and vitamin synthesis. GS

1058

Doi (T), Satoh (K), Kanzaki (M) and Matsumoto (K). **An investigation to determine lactose by using oxidation-reduction reaction and its application to some kinds of milk and milk products.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 38(7); 1991: 575-580 (Ja)

1059

Bastian (ED), Brown (RJ) and Ernstrom (CA). **Plasmin activity in milk coagulation.** *Journal of Dairy Science* 74(11); 1991: 3677-3685

Monthly milk samples were collected from 19 Holstein and 19 Jersey cows in separate herds during 10 months lactations (380 total samples). Effects of breed-herd, lactation number, season, and stage of lactation and the interactions of these parameters on plasmin, plasminogen, and milk-clotting measurements were determined. Lactation number had the greatest influence on plasmin activity, which increased during lactation but was not influenced by breed-herd, pH, protein, or fat. Stage of lactation and season were the only factors that influenced plasminogen. Percentage of plasminogen activated was highest during late lactation, in milk from fourth and later lactation cows, and during fall and winter. Plasmin activity did not influence milk-clotting parameters. Clotting time decreased as pH decreased and as protein and fat increased. Increased protein and fat improved firming rate of curd. Milk samples collected in the fall had the highest firming rates, and stage of lactation did not influence firming rate. Lower pH, higher protein, and higher fat decreased cutting time. Increased protein and fat improved curd firmness. Jersey herd milk had firmer curd than Holstein herd milk. Lactation number and stage of lactation did not influence curd firmness. AA

1060

El-Gazzar (FE), Bhoner (HF) and Marth (EH). **Antagonism between *Listeria monocytogenes* and lactococci during fermentation of products from ultrafiltered skim milk.** *Journal of Dairy Science* 75(1); 1992: 43-50

Tyndallized samples of unfiltered skim milk and retentate (conc. five-fold or twofold by vol.) and permeate from UF skim milk were inoculated with  $5.5 \times 10^3$  to  $1.5 \times 10^5$  cfu/ml of *L. monocytogenes* strains California or V7 together with  $4 \times 10^7$  to  $2.3 \times 10^8$  cfu/ml of mesophilic lactic acid bacteria. Numbers of *L. monocytogenes* (McBride Listeria agar) and lactic acid bacteria (all purpose Tween agar) were determined after 0, 6, 12, 24, 30 and 36 h of incubation at 30°C. Lactic acid bacteria significantly inhibited or inactivated *L. monocytogenes* in all 3 products. Inactivation was greater in permeate (6.77 orders of magnitude) than in unfiltered skim milk (3.67 orders of magnitude) or in retentate (4.21 orders of magnitude). Degree of inactivation in retentate was related to the extent of concn. Inactivation was not complete, and *L. monocytogenes* survived in these products during fermentation for up to 36 h. When fermented products were refrigerated (4°C), *L. monocytogenes* survived for 4 to 6 wk in skim milk, 3 to 5 wk in retentate, and 1 wk in permeate. At refrigeration temp., length of survival was dependent on type of product and strain of the pathogen. AA

1061

Chen (ZY) and Nawar (WW). **Prooxidative and antioxidative effects of phospholipids on milk fat.** *Journal of the Association of Official Analytical Chemists* 68(12); 1991: 938-940

The effects of dipalmitoylphosphatidylethanolamine (DPE) and dipalmitoylphosphatidylcholine (DPC) on milk fat oxidation was examined at 50 and 95°C under various conditions by monitoring oxygen uptake and fatty acid composition. DPE strongly inhibited milk fat oxidation both at 50 and 95°C in the absence of water. DPC was less effective than DPE. In aqueous systems, the reverse was observed. DPE accelerated milk fat oxidation at both 50 and 95°C. DPC accelerated the oxidation at 50°C, but inhibited it at 95°C. The free amino group in DPE may be responsible for its inhibiting effect in the dry system. The accelerating activity of DPE in the aqueous system is probably due to the formation of a more dispersed structure with better oxygen accessibility. AA

1062

Sharma (GP). **Milk packaging and distribution modes in India - A scenario.** *Beverage and Food World* 1994; 1992: 24-25



Milk production in India has increased rapidly after the implementation of operation flood programme in 1970. A var. of milk distribution methods are described briefly. The methods described are: distribution in bottles, plastic cans, tetrapack system, plastic sachets, insulated fibre glass reinforced polystyrene tank, bulk vending system; and cost of distribution is considered. BV

1063

Rao (KVSS) and Balachandran (R). **Role of hydrocolloids in stabilizing milk systems.** *Beverage and Food World* 19(4); 1992: 35-38

Discusses some of the stabilizational aspects of various milk systems when added with hydrocolloids. Topics covered are: hydrocolloids and their classification, functions of hydrocolloids, protein-polysaccharide interactions (coprecipitation phenomenon), hydrocolloids in different milk systems (skim milk, recombined milks, flavoured milks, cultured milk beverage, condensed/evaporated milks, sterilized cream, UHT milk desserts, ultra-pasteurized yoghurt drink, ice cream mix, paneer, and baby formula). 36 references. BV

#### Milk products

1064

Patel (RS), Renner (E), Jayaprakash (HM), Singh (S) and Yoon (YC). **Dietary calcium from milk products and its importance in human nutrition.** *Indian Dairyman* 44(11); 1992: 530-535

Reports the importance of Ca for the strength and integrity of teeth and bone; in the regulation of blood pressure, in the function of nervous system, for the growth of skeletal development, for the prevention of fractures and disability in later life; and its role as anti-cancer agent in the body. Dairy products like milk, dahi, yoghurt, paneer and cheese which are excellent sources of dietary Ca are recommended because compared to other sources of Ca the absorption of milk Ca is more due to the presence of co-nutrients like lactose, fat, protein and P in milk. The Ca content of dairy products are also given. GS

1065

Sarkar (S) and Misra (AK). **Utilization of milk preserved by LP-system for manufacture of cultured milk products.** *Indian Dairyman* 44(11); 1992: 536-540

Reports the effect of lactoperoxidase-thiocyanate-hydrogenperoxide (LP) system on starter activity and manufacture of cultured milk products; the techniques to overcome

the problem of reactivation of LP-system; and factors affecting successful utilization of LP treated milk for the manufacture of fermented milk products. GS

1066

Vaghela (MN) and Arun Kilara. **Nutritional and therapeutic aspects of indigenous and related western fermented milk products - a review.** *Indian Journal of Dairy Science* 45(8); 1992: 393-404

Aspects covered in this review include: nutritional attributes (fermentation of lactose, hydrolysis of protein and lipids, vitamins and minerals), therapeutic aspects (physiological, gastric emptying kinetics, glycemic index, urine acidity and health aspects: lactose intolerance, gastric diseases, gut microflora, atherosclerosis, anticarcinogenesis, antibacterial activity, neutralization of enterotoxins, growth promoting factors and immunological effects) and future prospects. 140 references. SRA

1067

Humbert (G), Collard-Bovy (C), Marchal (E), Linden (G), Montagne (P), Duheille (J), Varcin (P). **Microparticle-enhanced nephelometric immunoassay. 3. Application to milk and dairy products.** *Journal of Dairy Science* 74(11); 1991: 3709-3715

A microparticle-enhanced nephelometric immunoassay (NEPHELIA<sup>R</sup>) has been developed for the measurement of milk, whey and curd proteins ( $\alpha_s$ -casein, K-casein,  $\alpha$ -lactalbumin, and  $\beta$ -lactoglobulin). This new method was applied to measure milk protein variations in a year-long study. The protein levels and their chronological evolution agree with other published data. The effects of some technological treatments on these measurements were studied:  $\alpha$ -lactalbumin and K-casein were not modified during freezing-thawing cycles;  $\beta$ -lactoglobulin and  $\alpha_s$ -casein measurements were strongly influenced by freezing; the detn. of heat-processed  $\beta$ -lactoglobulin in the presence of K-casein was also altered; the technological treatments applied to raw milk for pasteurization and fat standardization of milk had no influence on the proteins' measured values. The  $\beta$ -lactoglobulin: $\alpha$ -lactalbumin ratio was determined as a good indication of heat denaturation. It was unmodified in standardized milk as well as in whey. The K-casein level in milk was correlated with some cheese-making parameters, particularly with soft and pressed cheese yield, which could be a good predictive factor in cheese making. AA

1068

Walker (RL), Jensen (LH), Kinde (H), Alexander (AV) and Owens (LS). **Environmental survey for *Listeria* species in frozen milk product plants in**



1069

Dommett (TW). **Spillage of aseptically packaged pasteurized liquid dairy products by thermodynamic psychrotrophs.** *Food Australia* 44(10): 1992: 459-461

Pilot plant investigations with homogenised milk, cream and reverse osmosis concentrate showed that a monoculture of spore-forming bacilli normally forms *Bacillus circulans* or *B. cereus*. Eventual shelf-life was affected mainly by storage temp. after processing, but smaller effects were due to pasteurisation temp. and cycle time. *B. circulans* has important characteristics selecting for survival and growth, including for very low temp. and low oxygen and mild acid. These factors and very high incidence of this organism in the trials suggest that *B. circulans* could be a potential problem in commercial packaged products. SRA

1070

Mital (BK) and Garg (SK). **Acidophilus milk products: Manufacture and therapeutics.** *Food Reviews International* 8(3): 1992: 347-389

This review summarizes the pertinent literature with particular reference to the manufacture of acidophilus milk products and their potential as therapeutic agents. Aspects included are: characteristics and growth (carbohydrate fermentation, minerals, amino acids and vitamins, fatty acids, nucleic acid derivatives, antibiotic sensitivity), of acidophilus bacteria, product manufacture (acidophilus milk, acidophilus milk products, soy acidophilus products, dried products), enumeration, therapeutics (survival and establishment in gastrointestinal tract, stabilization of microflora and control of intestinal infections, control of serum cholesterol, prevention of colon cancer, enhanced availability of nutrients), and future research. 294 references. SRA

## Cheese

1071

Bastian (ED), Hansen (KG) and Brown (RJ). **Activation of plasmin with urokinase in ultrafiltered milk for cheese manufacture.** *Journal of Dairy Science* 74(11): 1991: 3669-3676

Havarti and Saint-Paulin cheeses were manufactured by traditional and UF techniques. Urokinase and  $KIO_3$  were added individually and together to batches of retentate before cheese making. Cheeses were analyzed for solids, fat, total

N, pH 4.6 soluble N, NPN, plasmin activity, plasmin plus plasminogen activity, and casein degradation. 80 cheese samples were analyzed (2 var., 2 replications, and 5 treatments sampled after 1, 28, 56 and 84 days). Urokinase increased plasmin activity in UF Havarti and Saint-Paulin cheeses. This increased pH 4.6 soluble N levels and NPN, increased proteolysis of  $\beta$ -casein, and slightly improved the flavour profile (only Havarti). Potassium iodate in UF cheese inhibited starter organisms, did not influence plasmin activity, and did not improve ripening. Activation of plasminogen may aid in ripening some UF cheese var. AA

1072

Barbano (DM) and Rasmussen (RR). **Cheese yield performance of fermentation-produced chymosin and other milk coagulants.** *Journal of Dairy Science* 75(1): 1992: 1-12

Fat recovery, protein recovery, and cheese yield performance of a fermentation-produced chymosin was compared with other commonly used milk coagulants. In trial 1, performance of fermentation-produced chymosin was compared with proteases from *Mucor miehei* and *Mucor pusillus*. In trial 2, fermentation-produced chymosin was compared with calf rennet and adult bovine pepsin. In each trial, 3 vats of Cheddar cheese were made simultaneously from the same milk, using the same starter culture, with the 3 different coagulants. This was replicated 12 times in trial 1 and 9 times in trial 2. Generally, higher fat and protein losses in the whey were observed for proteases from *M. miehei* and *M. pusillus* than for fermentation-produced chymosin or calf rennet. Adult bovine pepsin had higher fat losses in the whey, but not higher protein losses in the whey than fermentation produced chymosin or calf rennet. In trial 1, fermentation-produced chymosin had a higher cheese yield efficiency than proteases from *M. miehei* and *M. pusillus* (0.54 and 0.74%, respectively) with a protected least significant difference of 0.34%. In trial 2, fermentation-produced chymosin (100% chymosin) and calf rennet (94% chymosin) had virtually identical cheese yield efficiencies, but adult bovine pepsin had a lower (0.39%) cheese yield efficiency with a protected least significant difference of 0.27%. AA

1073

Steele (JL) and Unlu (G). **Impact of lactic acid bacteria on cheese flavour development.** *Food Technology* 46(11): 1992: 128, 130, 132, 135

The enzymes and pathways believed to be of general importance in cheese flavour development is focused in this article. The importance of lactic acid bacteria in cheese flavour development either as the starter



culture or present as non-starter lactic acid bacteria, the metabolic properties of lactic acid bacteria, proteolysis and cheese flavour and the proteolytic enzyme system are the aspects covered. CSA

### Cheddar cheese

1074

Grazier (CL), Bodyfelt (FW), McDaniel (MR) and Torres (JA). **Temperature effects on the development of Cheddar cheese flavour and aroma.** *Journal of Dairy Science* 74(11): 1991: 3656-3668

Cooling of freshly formed Cheddar cheese is thought to be one of the processing steps that requires tighter control to achieve more uniform and consistent product quality. Cheese samples, obtained after pressing, were rapidly cooled to 5, 15, 25 or 35°C. Commercial samples and test cheese at 7, 30, 60, 90 and 120 days of ripening were evaluated by a trained descriptive panel. Most sensory characteristics of experimental cheese increased in intensity as a function of the interaction of time and temp. The perception of sour and salty taste was affected by temp. but at equal rates over time. Buttery aroma and flavour tended to decrease in intensity as a function of time and temp. AA

1075

Blank (G), Shamsuzzaman (K) and Sohal (S). **Use of electron beam irradiation for mold decontamination on Cheddar cheese.** *Journal of Dairy Science* 75(1): 1992: 13-18

Cheddar cheese slices, surface inoculated with either *Penicillium cycloptum* or *Aspergillus ochraceus* spores, were vacuum packaged and irradiated using an electron beam accelerator. Following treatment at 0.21 and 0.52 kGy, the shelf-life of cheese containing *P. cycloptum* was extended by 3 and 5.5 days, respectively, in comparison with inoculated, untreated samples. Under similar treatment and storage conditions, cheese containing *A. ochraceus* exhibited average shelf-life extension of 42.5 and 52.2 days respectively. Increasing the post irradiation storage temp. to 15°C reduced the shelf-life of cheese, especially with samples containing *A. ochraceus*. The lowest dose required to inactivate ca. 50 to 60 spores/cm<sup>2</sup> of either *A. ochraceus* or *P. cycloptum* on the surface of cheese was ca. 0.42 and 0.95 kGy, respectively. Irradiation survival curves of *A. ochraceus* and *P. cycloptum* spores in cheese yielded av. values (the dose required to reduce initial populations by 90%) of 0.21 and 0.42 kGy, respectively. AA

### Domiat cheese

1076

Abou-Zeid (NA). **Domiat cheese with vegetables.** *Indian Journal of Dairy Science* 45(8): 1992: 432-434

Some selected vegetables (Parsley, Rocket and Carrot) were used individually or in mixture at different concn. to make Domiat cheese. In panel tests, products made with 3% Parsley or Rocket got the best score and were chosen. During ripening of cheese, Parsley or Rocket increased protein and fat degradation and bacterial count, reflected by an improvement in the organoleptic properties of the manufactured cheese in a very short ripening period. AA

### Mozzarella cheese

1077

Oberg (CJ), Merrill (RK), Moyes (LV), Brown (RJ) and Richardson (GH). **Effects of *Lactobacillus helveticus* culture on physical properties of Mozzarella cheese.** *Journal of Dairy Science* 74(12): 1991: 4101-4107

Six-liter vats of Mozzarella cheese were made using either single strains of *Lact. helveticus* or paired strains of *L. helveticus* and *Streptococcus salivarius* ssp. *thermophilus*. *Lact. helveticus* strains were either strongly or weakly proteolytic as established by the o-phthaldialdehyde test. Three cheeses were made with each culture type and stored at 4°C. Stretch, melt, colour, moisture, and pH values were determined at 1, 7, 14, and 28 days. All cheeses lost stretch rapidly from day 1 to 7 and slowly declined between day 7 and 28. Melt increased rapidly for all cheeses from day 1 to 7 and then remained constant. Differences in stretch and melt from one culture type to another were not significant. Cheese made with proteinase-deficient strains had more stretch after holding for 14 and 28 days than cheese made with nondeficient strains. Time of storage significantly affected both stretch and melt over 28 days. Cheeses made from all 4 culture types decreased in cook colour, but the culture by time interaction was significant. Cheese made with pairs or single strains of *Lact. helveticus* had the same melt, more stretch, and less cook colour than cheese made with paired strains of *Lact. delbrueckii* ssp. *Lact. bulgaricus* and *S. salivarius* ssp. *thermophilus* studies previously. AA

### Dahi

1078

Misra (AK). **Commercial production of dahi by the dairy industry.** *Indian Dairyman* 44(10): 1992: 501-503



Reports the standardized method for commercial scale manufacture of 'dahi' (fermented milk); the types of *dahi* available in Indian market viz., whole milk *dahi* skim milk *dahi* and sweetened *dahi*; and the processing conditions and technological parameters viz., heat treatment of milk, homogenization, inoculation of culture, filling in retail containers, incubation, storage of curds at refrigeration temp. shelf-life and packaging materials. GS

## Ghee

1079

Galhotra (KK) and Wadhwa (BK). **Standardisation of spectrophotometric method for the estimation of lactones in ghee-residue.** *Indian Journal of Dairy Science* 45(8); 1992: 424-428

A spectrophotometric method was standardised for the estimation of lactones at 515 nm as their red-violet ferric hydroxamate derivatives. Difference in the lactone levels in *ghee*-residue estimated by spectrophotometric method and GLC method were non-significant. Hence the validity of the spectrophotometric method for the estimation of lactones in *ghee*-residue was confirmed. AA

## Ice cream

1080

Jana (AH) and Patel (HC). **Soft scoop icecream - a review.** *Indian Dairyman* 44(11); 1992: 541-546

Reviews the factors influencing soft-scoop properties in an ice cream viz., use of sweetener blends, attaining higher over run, modifying the stabilizer/emulsifier blend, separate processing of an emulsion mix and ice cream mix plus carbohydrate slurry, subjecting the frozen mix to mechanical action etc. Problems associated with use of soft-scoop ice cream viz., different flavours, profile requiring consumer adaptation, difficult portion control and higher price, are also discussed. GS

## Khoa

1081

Padmanabha Reddy (V) and Mohamed Habibulla Khan (M). **Effect of antimicrobial agents and packaging materials on the microbial quality of Khoa.** *Journal of Food Science and Technology (India)* 30(2); 1993: 130-131

The effectiveness of few selected antimicrobial agents and commonly available packaging materials on microbial quality of *khoa* during storage at 37 and 5°C showed a reduction in the counts of mesophilic aerobes, yeast and moulds with the incorporation of 0.30% potassium sorbate on product wt. basis and upon packing in Al foil. AA

## Lassi

1082

Pillai (RAV), Mohamed Habibulla Khan (M) and Padmanabha Reddy (V). **Incidence of aerobic spore formers in Lassi.** *Journal of Food Science and Technology (India)* 30(2); 1993: 141-142

Analysis of 75 market samples of *lassi* revealed higher incidence of aerobic spore formers in samples from local vendors, followed by private manufacturers and organised dairies. The occurrence of *Bacillus subtilis* was high and the isolated *B. cereus* were non-toxigenic in nature. AA

## Wheys

1083

Kanawjia (SK), Sukhbir and Singh (S). **Application of hydrolysed lactose whey in food processing.** *Indian Dairyman* 44(12); 1992: 600-603

Enzymatic process to manufacture hydrolysed lactose (HYLA) syrup from whey is described. Whey obtained from cheese/*paneer*/casein making is desalted by electrodialysis and pH is brought down to normally 3.6 with HCl. The acidified whey is centrifuged and pasteurized. Whey hydrolysis of lactose is performed by application of  $\beta$ -galactosidase enzymes obtained from any microbial source. The content is partially conc. (about 67.5% TS) after neutralization to pH 6.5. Lactose crystals are added, the concentrate is cooled and packed. The application of HYLA in bread and bakery products, frozen milk and milk shakes, chewing gum and ice cream: their nutritive value and organoleptic advantages are discussed. GS

## Whey protein concentrate

1084

Dauhin (G), Labbe (J-P), Quemerais (A) and Michel (F). **Fouling of an inorganic membrane during ultrafiltration of defatted whey protein concentrates.** *Netherlands Milk and Dairy Journal* 45(4); 1991: 259-272

Ultrafiltration of sweet whey or defatted whey and whey protein concentrates has been carried out on an inorganic membrane. Fouling was modelled as



hydraulic resistances opposing solvent transfer. The fouling layers left on the membrane were characterized by infra-red and X-ray photoelectron spectroscopy. Despite the absence of lipids in defatted WPC, the membrane permeability decreased in the course of time. Calcium phosphates (apatite structures) were partly responsible for this. The part played by proteins, either absorbed or involved in the reversible concn. polarization layer, is larger when their concn. is higher, especially for lower pH values (6.25 as compared to 6.5). AA

## Whey proteins

1085

Schmidt (DG) and Poll (JK). **Enzymatic hydrolysis of whey proteins. Hydrolysis of  $\alpha$ -lactalbumin and  $\beta$ -lactoglobulin in buffer solutions by proteolytic enzymes.** *Netherlands Milk and Dairy Journal* 45(4); 1991; 225-240

The main whey proteins from cow's milk,  $\alpha$ -lactalbumin ( $\alpha$ La) and  $\beta$ -lactoglobulin ( $\beta$ Lg), were hydrolysed in 0.1 M buffer sol. using different proteolytic enzymes (serine proteinases, cysteine proteinases, aspartic proteinases and metallo-proteinases). The hydrolysates were studied by SDS gel electrophoresis. The action of the same enzyme on either  $\alpha$ La and  $\beta$ Lg frequently differed and was further shown to depend on the composition of the medium (e.g. presence of  $\text{Ca}^{2+}$ ), incubation temp. and the degree of denaturation of the protein. Both  $\alpha$ La and  $\beta$ Lg were rapidly hydrolysed to a large extent by subtilisin and proteinase K. A rapid and extensive hydrolysis of  $\alpha$ La could further be achieved by  $\alpha$ -chymotrypsin, pepsin and pronase. Large peptides with estimated mol. wts. between 2000 and 5000 were formed in appreciable amounts during the hydrolysis of  $\alpha$ La with  $\alpha$ -chymotrypsin, elastase and pronase and of  $\beta$ Lg with  $\alpha$ -chymotrypsin, papain, bromelain and pronase. AA

## Yoghurts

1086

Barnes (DL), Harper (SJ), Bodyfelt (FW) and McDaniel (MR). **Prediction of consumer acceptability of yoghurt by sensory and analytical measures of sweetness and sourness.** *Journal of Dairy Science* 74(11); 1991; 3746-3754

The objective of this study was to determine whether predictions of consumer overall liking for yoghurt could be made using trained panel ratings of sweetness and sourness and analytical measures of sugars and acids. 49 commercial prestirred yoghurts (14 strawberry-flavoured,

12-raspberry-flavoured, 6 lemon-flavoured, and 17 unflavoured) were evaluated for sweetness and sourness intensity by a trained panel (11 panelists) and for overall liking by a consumer panel (90 to 182 panelists). Titratable acidity and pH were measured for all samples, but sugars were measured by HPLC only for the flavoured yoghurts. Consumer overall liking was significantly correlated with sweetness intensity, sweetness:sourness ratio, and the summed impact of sweetness and sourness for strawberry and raspberry yoghurt. No correlations between analytical measurements and overall liking were found for any of the yoghurts. A sweetness:sourness ratio  $> 1.0$  for strawberry-flavoured and  $> 0.8$  for raspberry- and lemon-flavoured yoghurts appeared necessary for high consumer acceptance. Generally, it was found that the sweeter the yoghurt, the higher the acceptance of these fruit-flavoured yoghurts by consumers. No relationships were found for any sensory and analytical measurements for predicting the overall liking of plain yoghurt. The best predictors of consumer liking of fruit-flavoured yoghurt were the descriptive panel ratings. AA

1087

Opdahl (LJ) and Baer (RJ). **Composition and consumer acceptance of frozen yoghurts utilizing whey protein concentrates.** *Journal of Dairy Science* 74(12); 1992; 4151-4163

Whey protein concentrate (WPC) and a new fermented WPC were used to replace the milk SNF in frozen yoghurt. Fermented WPC was manufactured by fermenting liquid WPC with a commercial culture of *Lactobacillus delbrueckii* ssp. *thermophilus*. Frozen yoghurt mix contained 6% milk fat, 10.5% WPC (100% SNF replacement), 11% sucrose, 3% corn syrup solids, 0.3% stabilizer and emulsifier blend, and 30.8% total solids. The mix was pasteurized (72°C for 30 min) and cooled to 4°C. Fermented WPC (3.1% by wt. of mix) was then added for a final titratable acidity of 0.43%. Frozen yoghurt mix was divided into 3 batches, which were manufactured into vanilla, strawberry, and chocolate frozen yoghurt. The frozen yoghurts were evaluated from questionnaires filled out by 1005 attendees of the Meeker County Fair in Litchfield, MN. Those surveyed were 43.5% males and 56.5% females, ranging in age from 6 to 89 yr. Overall, 87.8% (83.5% of the males and 91.5% of the females) liked the test product, and 81.2% (72.4% of the males and 88.2% of the females) said they would buy this product if it were priced the same as ice cream. Results indicate that an acceptable frozen yoghurt can be produced when 100% of the milk SNF is replaced with WPC and fermented WPC. AA



Gaafar (AM). **Volatile flavour compounds of yoghurt.** *International Journal of Food Science and Technology* 27(1); 1992; 87-91

The volatile flavour compounds of 3 samples of Egyptian yoghurt were analysed over a 2-wk period at 8°C using a simple headspace GC technique in order to study the changes and relate them to flavour acceptability. Volatile compounds present were acetaldehyde, diacetyl, acetoin, acetone, butanone, and acetic acid. Acetone and butanone disappeared within the first wk of storage, whereas acetaldehyde, diacetyl and acetoin declined steadily but were still present after 2 wks. Acetic acid increased to about twice its original level after 10 days of storage. The decreases in acetyldehyde, diacetyl, acetoin, and the increase of acetic acid were closely related to the rapid decrease in product acceptability after 8 - 10 days storage. AA

### Milk proteins

1089

Gothwal (PP) and Bhavadasan (MK). **The role of proteins on browning in milk.** *Indian Journal of Dairy Science* 45(8); 1992; 419-423

The browning indices in control cow and buffalo skim milk samples were 0.469 and 0.685 respectively. The increase of increasing protein level resulted in increased browning index progressively upto protein level of 3.2% in cow milk. 5% protein level resulted in moderate increase in browning. This was more significant in buffalo milk. Studies using synthetic milk systems showed that casein contributes more to browning than whey protein.  $\alpha_s$ -casein contributed to higher browning than by  $\beta$ - or  $k$ -casein. SRA

1090

Marchal (E), Collard-Bovy (C), Humbert (G), Linden (G), Montagne (P), Duheille (J), Varcin (P). **Microparticle-enhanced nephelometric immunoassay. 2. Measurement of  $\alpha$ -lactalbumin and  $\beta$ -lactoglobulin.** *Journal of Dairy Science* 74(11); 1991; 3702-3708

A microparticle-enhanced nephelometric immunoassay (NEPHELIA<sup>R</sup>) was developed for the detn. of  $\alpha$ -lactalbumin and  $\beta$ -lactoglobulin in bovine milk, whey, and curd from soft cheese (Camembert-type cheese) and pressed cheese (Saint Paulin-type cheese). Diluted milk, whey, and dissolved curd samples were used without pretreatment and mixed with  $\alpha$ -lactalbumin-coated or  $\beta$ -lactoglobulin-coated microspheres and highly diluted anti- $\alpha$ -lactalbumin-specific or anti- $\beta$ -lactoglobulin-specific antiserum. After a

reaction time of 1 h, the light scattered by the clusters of coated microspheres was measured using a nephelometer and compared with calibration curves developed with a low heat milk powder, corrected for its heat sensitive  $\beta$ -lactoglobulin content. Recovery (97.2 to 102.2%) and precision (coeff. of variation from 1.4 to 6.1% for milk and whey) studies showed the reliability of this method for the quantitation of whey proteins. AA

1091

Mistry (VV) and Hassan (HN). **Delactosed, high milk protein powder. 2. Physical and functional properties.** *Journal of Dairy Science* 74(11); 1991; 3716-3723

The objective of this research was to examine some physicochemical properties of a novel delactosed, high milk protein powder. Data indicate that the solubility index of the powder was dependent on temp. of mixing. Solubility index decreased (solubility increased) as temp. increased from 25 to 60°C. Foaming capacity, expressed as percentage overrun, was low at pH 7 and 8 but increased at higher pH; e.g., after 10 min of whipping, overrun increased from 470 to 941% as pH increased from 7 to 10. Foaming increased with time at higher pH but not at lower pH. Particles of the high milk protein powders as examined by scanning electron microscopy were characterized by smooth surface and dents. Particles of skim milk powder prepared in the same spray dryer had a wrinkled surface. Commercial casein products had a structure similar to that of the high milk protein powders. AA

1092

Schmidt (KA) and Smith (DE). **Rheological properties of gum and milk protein interactions.** *Journal of Dairy Science* 75(1); 1992; 36-42

Three different gums (K-carrageenan, guar, and xanthan at concn. of 0.05, 0.10, or 0.20%) were dispersed in 11% NDM, 11% whey protein conc., or double-distilled, deionized water. All sol. were either batch (69°C for 30 min) or HTST (81°C for 25 s) pasteurized. Rheological properties were measured the following day using a viscometer. Measurements were made at 4°C over a shear rate range of 1 to 875 s<sup>-1</sup>. Apparent viscosities were calculated and compared at shear rate of 250 s<sup>-1</sup>. A 4-factor interaction involving gum type, gum concn, protein type and heat treatment was significant. Differences among the means showed that carrageenan-NDM sol. were more viscous than carrageenan-water sol. when compared at equivalent gum concn. The flow behaviour index values indicated that at low gum concn. the sol. possessed Newtonian flow behaviour; however, at



higher concn., the flow behaviour was pseudoplastic. AA

## Caseins

1093

Collard-Bovy (C), Marchal (E), Humbert (G), Linden (G), Montagne (P), El Bari (N), Duheille (J), Varcin (P). **Microparticle-enhanced nephelometric immunoassay. 1. Measurement of  $\alpha_s$ -casein and k-casein.** *Journal of Dairy Science* 74(11); 1991: 3695-3701

$\alpha_s$ -Casein and K-casein were measured in milk and curd by a microparticle-enhanced nephelometric immunoassay (NEPHELIA<sup>R</sup>). Specifically designed microspheres were coated with antigen ( $\alpha_s$ -casein and K-casein) and then were agglutinated by specific antibodies. The light scattered by the agglutinates was quantified with a nephelometer. Antigen-coated microsphere agglutination was inhibited by free antigen sol., allowing its measurement. Calibration curves for  $\alpha_s$ -casein and K-casein in milk and curd, performed with a low heat milk powder as standard, largely covered the usual concn. of caseins. Accuracy (av. ratios of recovery were 98.7 and 104.3%) and precision (coeff. of variation from 1.9 to 7.4%) assessed the fidelity of the method. NEPHELIA<sup>R</sup>, applied to casein detn., offers many advantages over the classical methods of milk protein measurement: high dilution of the reagents, no pretreatment of the samples, enhanced sensitivity (few micrograms per liter), short reaction time (1 h), and easy use (no washing or phase separation). AA

## MEAT AND POULTRY

1094

Forsythe (RH) and Waldroup (AL). **Safe meat and poultry: An industry achievement.** *Dairy, Food and Environmental Sanitation* 12(3); 1992: 149-153

## Meat

1095

Tarwate (BG), Sherikar (AT) and Murugkar (HV). **Microbiological analysis of environmental sources of contamination in Deonar Abattoir.** *Journal of Food Science and Technology (India)* 30(2); 1993: 127-129

Investigation was carried out to analyse microbiological hazards and to determine the critical control points in the buffalo slaughterline. Nine different points in the slaughterhouse were selected and samples were analysed for total viable counts

and the numbers of faecal coliforms, Enterobacteriaceae, *Bacillus* spp., *Staphylococcus* spp. and *Clostridium* spp. Highly significant differences among different points were observed. The max. levels of contamination amongst slaughterhouse points were noted for floors, platforms and walls with a mean total viable count of 4.11 plus or minus 0.50 log<sub>10</sub> CFU/sq cm. The floors, platforms, walls, knives, axe, saw-blade, hooks and handswabs were considered as critical points in the slaughterhouse and monitoring of these points would lead to the development of HACCP in slaughterhouse. AA

1096

Lambert (AD), Smith (JP) and Dodds (KL). **Shelf-life extension and microbiological safety of fresh meat - a review.** *Food Microbiology* 8(4); 1991: 267-297

This review focuses on the biochemical and microbiological composition of fresh meat, the spoilage patterns in fresh meat and the combination treatments which can be used by the meat processor to extend the shelf-life and keeping quality of meat at refrigerated storage temp. The review also addresses the safety concerns of modified atm. packaging/irradiated fresh meat specifically with respect to growth of, and toxin production by *Clostridium botulinum* types A and B and other pathogens, particularly under mild temp. abuse conditions. 153 references. SRA

1097

Gill (CO) and Jeremiah (LE). **The storage life of non-muscle offals packaged under vacuum or carbon dioxide.** *Food Microbiology* 8(4); 1991: 339-353

Beef livers and sweetbreads and pork livers and kidneys were collected from commercial slaughter operations, packaged under vacuum or CO<sub>2</sub>, and then stored at -1.5°C. Offals were microbiologically and organoleptically assessed at intervals of 3 wks until they were grossly spoiled. After 6 wks storage, vacuum-packaged livers had a low pH and were spoiled by autolytic and microbial activities. Carbon dioxide packaging delayed the fall in tissue pH and the development of microbial spoilage, but did not obviously retard the autolytic deterioration of livers. After 6 wks storage, vacuum-packaged kidneys were spoiled by lines of white granules (presumably tyrosine crystals) on organ surfaces and, after 12 wks storage, by offensive odours and flavours of microbial origin. Carbon-dioxide packaging delayed the appearance of blemishes for further 9 wks and microbial spoilage of kidneys for a further 3 wks. After 12 wks storage, vacuum-packaged sweetbreads were spoiled by green discolouration



and spoilage odours and flavours as results of microbial activities. Carbon-dioxide packaging prevented the development of green discolouration and extended the time before spoilage odours and flavours were evident to 18 wks. However, after storage for 9 wks the appearance of sweetbreads packaged under CO<sub>2</sub> deteriorated because of staining of surfaces with blood pigments. AA

1098

Vanderlinde (PB) and Grau (FH). **Detection of *Listeria* spp. in meat and environmental samples by an enzyme-linked immunosorbent assay (ELISA).** *Journal of Food Protection* 54(3): 1991: 230-231

An ELISA kit (TECRA™) for the detection of *Listeria* spp. was evaluated for its ability to detect these organisms in naturally contaminated meat and in environmental samples from meat processing plants. Of the 170 samples examined, *Listeria monocytogenes* and/or *L. innocua* were detected in 74 by enrichment and selective plating. Testing of enrichment broths with the ELISA kit detected 72 of the positive samples and gave 2-false-negative and 2 false-positive reactions. AA

1099

Taylor (MAJ) and Etherington (DJ). **The solubilization of myofibrillar proteins by calcium ions.** *Meat Science* 29(3): 1991: 211-219

The effect of elevated levels (30 mM) of Ca<sup>2+</sup> and other divalent metal ions on rabbit psoas myofibrils was studied to determine whether these caused solubilization of structural proteins and if so whether the effect was due to salting-in or to proteolytic fragmentation resulting from activation of calpains. Incubation of myofibrils in 30 mM CaCl<sub>2</sub> at either pH 5.6 or 7.0 did not cause any apparent solubilization of the major Z-disc proteins, but there was an immediate (< 1 min) solubilization of C-protein and troponin I together with small amounts of Mr 80000 protein, troponin T and tropomyosin. Longer incubations with CaCl<sub>2</sub> extracted little additional C-protein but there was a steady increase with time in the solubilization of proteins with Mr values of 45000 and 42000, troponin T, tropomyosin and troponin I. Another high mol. wt. protein of Mr 3-400 000 was extracted at pH 7.0 but not at pH 5.6. Similar results were obtained on incubation with 30 mM MgCl<sub>2</sub>. In contrast to these findings, the same concn. of ZnCl<sub>2</sub> caused no detectable solubilization of myofibrillar proteins. The inclusion of proteinase inhibitors, E64, leupeptin, pepstatin or PMSF did not prevent the immediate solubilization of proteins. This showed that the solubilization of the proteins by

Ca<sup>2+</sup> ions was due to salting-in rather than to proteolytic action by calpains. AA

1100

Correia (LR) and Mittal (GS). **Kinetics of hydration properties of meat emulsions containing various fillers during smokehouse cooking.** *Meat Science* 29(4): 1991: 335-351

The cooking kinetics of meat emulsions containing various fillers was determined by monitoring changes in hydration properties such as cooking loss and water-holding capacity during smokehouse cooking. Press juice, consumer cook test and emulsion stability of cooked product were also determined. The fillers used were buttermilk powder, corn starch, microcrystalline cellulose, modified corn starch, modified wheat flour, soy-protein conc. and whey-protein conc. The cooking process was modelled using reaction kinetics and Eyring's absolute reaction rate theory. Enthalpy and entropy changes of activation were calculated for various properties and fillers. AA

1101

Correia (LR) and Mittal (GS). **Kinetics of pH and colour of meat emulsions containing various fillers during smokehouse cooking.** *Meat Science* 29(4): 1991: 353-364

The cooking kinetics of meat emulsions containing various fillers was determined by monitoring changes in pH and colour during smokehouse cooking. The fillers used were buttermilk powder, corn starch, microcrystalline cellulose, modified corn starch, modified wheat flour, soy protein concentrate and whey protein concentrate. The cooking process was modelled using reaction kinetics and Eyring's absolute reaction rate theory. Enthalpy and entropy changes of activation were calculated for various properties and fillers. AA

1102

Tompkin (RB), Christiansen (LN), Shaparis (AB), Baker (RL) and Schroeder (JM). **Control of *Listeria monocytogenes* in processed meats.** *Food Australia* 44(8): 1992: 370-371, 373-376

This article summarises several recommendations and regulatory policies for *L. monocytogenes* in processed meats, and describes the experiences of one producer in attempts to control *L. monocytogenes* in 12 processed meat plants. It is concluded that the risk of product contamination by *L. monocytogenes* can be reduced but, with current technology, the organism cannot be eradicated from the finished product environment. SRA



1103

Barai (BK), Nayak (RR), Singhal (RS) and Kulkarni (PR). **Approaches to the detection of meat adulteration.** *Trends in Food Science and Technology* 3(3); 1992: 69-72

Reviews common meat adulterants such as dried bread, corn meal potato starch, crackers, waste biscuit, boiled rice, chickpea flour, and water gelation in smoked meat products: blood in hamburgers; sausages (frankfurters, bologna and pork); soybean protein, non-fat dried milk, milk co-precipitates and cereal flours. The DNA probe technology for meat sp. testing may give rise to a new battery of tests for meat adulteration. Techniques (electrophoretic, immunological (ELISA) and other analytical techniques) for the identification of meats from different animal sp. is covered briefly in this review. 33 references. GS

## Beef

1104

Renner (M) and Bonhomme (J). **Effects of electrical stimulation, boning-temperature and conditioning mode on display colour of beef meat.** *Meat Science* 29(3); 1991: 191-202

1105

Surve (AN), Sherikar (AT), Bhilegoankar (KN) and Karkare (UD). **Preservative effect of combinations of acetic acid with lactic or propionic acid on buffalo meat stored at refrigeration temperature.** *Meat Science* 29(4); 1991: 309-322

## Mutton

1106

Kondalah (N), Anjaneyulu (ASR) and Lakshmanan (V). **Incorporation of chicken byproducts in mutton nuggets.** *Journal of Food Science and Technology (India)* 30(2); 1993: 143-144

Emulsion-based mutton nuggets, incorporating chicken byproducts i.e. skin, gizzard and heart (SGH) from spent hens, were evaluated for yield and quality. Three formulations containing 15% mutton fat, 15 and 25% SGH were compared. Emulsion stability, cooking loss and composition were nearly similar, but flavour scores were significantly higher for 15% SGH. Incorporation of SGH resulted in better acceptability of mutton nuggets as compared to those with mutton fat. AA

## Goat

1107

Horgan (DJ), Jones (PN), King (NL), Kurth (LB) and Kuypers (R). **The relationship between animal age and the thermal stability and cross-link content from five goat muscles.** *Meat Science* 29(3); 1991: 251-262

The thermal stability of intramuscular collagen, as determined using differential scanning calorimetry, was measured in 5 muscles from 75 goats with known birth dates ranging in age from one day to 13 yrs. The collagen cross-link pyridinoline, and the collagen-associated, and putative cross-link, Ehrlich Chromogen were also measured. Five different muscles were examined and the effects of age compared to those found in the tendon of the *Longissimus dorsi* muscle. The differences between intramuscular collagen and tendon collagen were found to be much greater than those between the intramuscular collagens of different muscles. Intramuscular collagen is more thermally stable than tendon collagen due to higher levels of heat-stable cross-links. However the increase in thermal stability of intramuscular collagen with age could not be explained simply in terms of the cross-links measured. AA

## Sheep

## Lamb

1108

Jones (SDM), Jeremiah (LE), Tong (AKW), Robertson (WM) and Gibson (LL). **Estimation of lamb carcass composition using an electronic probe, a visual scoring system and carcass measurement.** *Canadian Journal of Animal Science* 72(2); 1992: 237-244

Sixteen hundred and sixty lambs were used to determine the precision of carcass measurements (fat thickness, muscle thickness, tissue depth) and a visual scoring system for muscle and fat thickness to estimate carcass composition. Measurements of fat (F) and muscle (M) thickness were made in warm and cold carcasses and total tissue depth in warm carcasses only between the 10th and 11th ribs and the 12th and 13th ribs using an electronic probe (Hennessy Grading Probe HGP). F explained 40 - 64% of the variation in carcass lean and 44-72% of the variation in carcass fat depending on the location and number of measurements and whether they were made on a warm or cold carcass. In most cases when M was added to F there was no increase in the variation explained in composition over that provided by F alone. Total tissue depth measurements differed in precision for the prediction of carcass lean content with the 12th rib being superior to the 10th rib (RSD for 12th rib, 33.2 g kg<sup>-1</sup>; 10th rib, 36.6 g kg<sup>-1</sup>). Visual assessment of



carcasses for fatness had the lowest precision for the prediction of lean content (RSD, 44.5 g kg<sup>-1</sup>). Loin eye area and fat thickness measured at the 12th rib had similar precision for the estimation of lean content as probe measurements. It was concluded that probe measurements of F or tissue depth between the 12th and 13th ribs would provide a superior method to the visual assessment of carcass fatness used in this study for classifying lamb carcasses for lean content and would allow carcasses to be graded on the slaughter floor. AA

## Pork

1109

Leseigneur-Meynier (A) and Gandemer (G). **Lipid composition of pork muscle in relation to the metabolic type of the fibres.** *Meat Science* 29(3): 1991; 229-241

## Rabbit

1110

Kang (JO), Kamisoyama (H), Shigemori (S), Hayakawa (I) and Ito (T). **Effect of electrical stimulation on the rheological properties of rabbit skeletal muscle.** *Meat Science* 29(3): 1991; 203-210

The effect of electrical stimulation on the rheological properties of rabbit skeletal muscle after death was investigated. The extensibility of electrically stimulated psoas muscles decreased more rapidly than that of non-stimulated muscles. For raw non-stimulated *Longissimus thoracis* muscles excised from the carcasses immediately after slaughter, the penetration force required was greatest 24 h after slaughter and then decreased slightly after 168 h. The corresponding force for stimulated *L. thoracis* muscles increased to the max. in 12 h and decreased to values < non-stimulated muscles. However, in the case of raw *L. thoracis* muscles which had been attached to the skeleton until measurement, there was no significant difference in penetration force between stimulated and non-stimulated muscles. In cooked muscles, electrical stimulation resulted in lower penetration forces at 24 h post mortem, but on further storage the differences decreased. AA

## Products

1111

Hung (SC) and Zayas (JF). **Functionality of milk proteins and corn germ protein flour in commercial meat products.** *Journal of Food Quality* 15(2): 1992; 139-152

Effects of corn germ protein flour (CGPF), nonfat dry milk (NFDM), whey protein concentrate (WPC), and sodium caseinate (SC) on quality characteristics of comminuted meat products were studied. Water holding capacity (WHC) was lowest and cooking loss was highest for the control formulation, whereas formulations extended with CGPF and milk proteins were higher in WHC and lower in cooking losses. Shear force and firmness increased as extenders were added, except WPC. All frankfurters with extenders were firmer than the control, except those extended with WPC. Hue angle was highest for samples with CGPF, while no differences were found in hue angle between control and milk proteins containing samples, except samples with WPC. Frankfurters with CGPF and SC add has a stronger atypical aroma than the control. Meaty aroma score was higher for the control than the other products, except those with WPC. Meaty flavour score was higher for the control than for all other products. The product with CGPF added had a stronger atypical flavour than the control. Frankfurters containing extenders were not as juicy as the all-meat control. AA

1112

Wang (CR) and Zayas (JF). **Comparative study of corn germ and soy proteins utilization in comminuted meat products.** *Journal of Food Quality* 15(2): 1992; 153-167

No significant differences in proximate composition of frankfurters containing soy flour (SF), soy concentrate (SC) and corn germ protein flour (CGPF) at 3.5% or 2% soy isolate (SI) were observed. Frankfurters formulated with high plant protein flour had lower cholesterol, and higher protein content than the all-meat control frankfurters. Control frankfurters had lower water holding capacity and higher cooking losses than those containing plant proteins. No significant differences ( $P > 0.05$ ) were found in textural and colour characteristics. A typical aroma and flavour profiles increased in frankfurters with SF and CGPF extension. BV

1113

Zarkadas (CG). **Assessment of the protein quality of selected meat products based on their amino acid profiles and their myofibrillar and connective tissue protein contents.** *Journal of Agricultural and Food Chemistry* 40(5): 1992; 790-800

The amino acid profiles and levels of myosin, actin, collagen, and collagen-like proteins in extended composite meats were examined as potential indices to assess protein quality of such products. The myofibrillar and connective tissue protein levels of



typical composite meat products were determined from the amounts of N-methylhistidine and 5-hydroxylysine, respectively, found in their acid hydrolysates. When the sum of the myofibrillar and connective tissue proteins was subtracted from the total protein of these products, the difference was an accurate detn. of the nonmeat proteins present. Composite meats varied in their amino acid composition and content of myofibrillar (17.4 - 52.3%), connective tissue (4.1 - 19.0%), and nonmuscle protein (2.4 - 67.2%), depending upon the meat cuts and nonmeat protein ingredients used to formulate them. As the content of collagen increased, three of the nonessential amino acids, glycine, proline, and 4-hydroxyproline, increased while the levels of lysine and other essential amino acids decreased. Calculated PERs ranged from 2.7 to 2.9 depending upon amounts of nonmuscle protein additives present. AA

## Ham

1114

Andersen (HJ) and Rasmussen (MA). **Interactive packaging as protection against photodegradation of the colour of pasteurized, sliced ham.** *International Journal of Food Science and Technology* 27(1): 1992: 1-8

Interactive packaging using oxygen absorbers with concomitant development of carbon dioxide and packaging material with low oxygen transmission rate (OTR:  $2 \text{ cm}^3 \text{ m}^{-2} 24 \text{ h atm}^{-1}$ ) has been found to completely eliminate discoloration of pasteurized, sliced ham normally encountered as a result of photo-oxidation of nitric oxide pigments during the first 24 h of display in illuminated chill cabinets. Further this packaging procedure has been found to be superior to conventional vacuum-packaging (90% initial vacuum) with regard to overall sensory evaluation, and equal to vacuum-packaging with 99% initial vacuum and interactive packaging using oxygen absorber, respectively, with regard to both overall sensory evaluation, and microbial load at the end of a storage period of 26 days. AA

## Sausages

1115

Alley (G), Cours (D) and Demeryer (D). **Effect of nitrate, nitrite and ascorbate on colour and colour stability of dry, fermented sausage prepared using 'Back Slopping'.** *Meat Science* 32(3): 1992: 279-287

The effect of various levels of nitrite and nitrate, with and without ascorbate, in sausages prepared using 'back slopping' as inoculation, was investigated in 3 series of exp., in all exp., nitrite was rapidly depleted

and nitrate formed. Nitrate was not used, probably because of the lack of (active) micrococci in the starter sausage. Surface colour was found to be darker with increasing levels of nitrite. Irrespective of nitrate, colour stability was mainly promoted by residual ascorbate. The latter decreased with increasing nitrite levels. AA

## Poultry

1116

Haq (S), Jalil (MA), Islam (MR) and Begum (J). **A review on the poultry production and development in Bangladesh.** *Poultry Guide* 29(9): 1992: 57-60

Reviews poultry population and distribution in Bangladesh, its socio-economic aspects, public sector and private sector development strategies: farmers training programmes: poultry diseases: fund and credit facilities and marketing systems. GS

1117

Panda (B). **Poultry development strategies.** *Poultry Guide* 29(11): 1992: 21-27

Evaluates the Indian poultry industry covering the salient strategies of research and development of poultry production, problems and solutions in poultry breeding, poultry feed, health, housing and management: efforts made in improvising post-harvest technology and marketing of poultry: agencies to impart poultry education and training: institutional finance and insurance facilities: inclusion of other avian species with poultry farming and strategies for future development of the industry. GS

## Chickens

1118

Sachdev (AK), Verma (SS) and Ram Gopal. **Processing of chicken gizzard pickle.** *Poultry Guide* 29(9): 1992: 33-36

Chicken gizzard pickles - ((i) oil-based (OB) and (ii) Vinegar-based (VB)) were processed and stored under different ambient conditions. They stored well at ambient and refrigerated temp. for 45 days in summer, rainy (av. ambient temp. 27.30 to 34.15°C; 63.05 to 68.35% RH) and upto 75 days in winter (16.58 to 25.64°C; 61.15 to 71.20% RH) seasons. Cost of production of OB pickle was higher. GS



Gillett (RAN) and Carpenter (JA). **Effects of binding substrate, type of nonmeat additive and method of tenderizing on cured chicken rolls.** *Journal of Food Quality* 15(3); 1992: 225-238

Chicken rolls were manufactured using ground dark fowl meat or mechanically deboned poultry meat as a binding substrate. Na caseinate or soy isolate and a meat block that was mechanically tenderized or chunked. Effects of these treatments on yield, chemical composition, sensory and texture profile attributes were evaluated in this study. Inclusion of soy isolate increased the cook yield and improved colour over Na caseinate ( $P < 0.05$ ). Likewise, rolls containing ground-dark fowl meat were lighter in colour than those made with mechanically deboned poultry meat. Rolls made with mechanically deboned poultry meat had greater chewiness, while those made with Na caseinate had greater cohesiveness. Texture profile analysis indicated that mechanical tenderization was the predominant factor in producing a softer and more springy chicken roll. Sensory evaluation revealed that mechanical tenderization decreased chewiness as compared to cubing ( $P < 0.05$ ). AA

1120

Lakritz (L) and Thayer (DW). **Effect of ionizing radiation on unesterified tocopherols in fresh chicken breast muscle.** *Meat Science* 32(3); 1992: 257-265

The effect of ionizing radiation on free tocopherols in chicken was determined. Raw chicken breast muscle with skin and adipose tissue removed was subjected to  $\gamma$ -radiation from a  $^{137}\text{Cs}$  source at 1, 2.25, 5.0 and 10.0 kGy. The chicken was packaged aerobically, and irradiated at 4°C. Free tocopherols were extracted directly from the meat without a saponification step. The tocopherols were resolved using normal phase, HPLC by spectrophotofluorometric detection. Irradiation resulted in a significant linear decrease in  $\alpha$ - and  $\gamma$ -tocopherol with increasing dose levels. At 3 kGy, the max. level approved by the FDA for poultry, a 15% reduction of free  $\gamma$ -tocopherol and a 30% reduction for free  $\alpha$ -tocopherol were observed. AA

1121

Shahidi (F), Synowiecki (J) and Onodanlore (AC). **Effects of aqueous washings on colour and nutrient quality of mechanically deboned chicken meat.** *Meat Science* 32(3); 1992: 289-297

Mechanically deboned chicken meat (MDCM) was washed with water, 0.5% NaCl or 0.5%  $\text{NaHCO}_3$  sol. Approx. 75.5% of the total hemoprotein pigments were removed by washing of MDCM with a sodium

bicarbonate sol. which resulted in the best colour improvements in the samples. Approx. 18.7% of total lipids were removed as a result of aqueous washing. The yield of proteins ranged from 56.5% after one washing with water to 43.4% after washing with water and then with a sodium bicarbonate sol. The Hunter L and a colour parameters of the samples correlated well with the total hemoproteins (correlation coeff. -0.984 and +0.947, respectively); corresponding correlation coeff. with the Hunter b value was only +0.693. AA

1122

Surowka (K) and Fik (M). **Studies on the recovery of proteinaceous substances from chicken heads. I. An application of neutrase to the production of protein hydrolysate.** *International Journal of Food Science and Technology* 27(1); 1992: 9-20

Minced heads of broiler chickens were hydrolysed under various conditions using neutral protease from *Bacillus subtilis*. It was found that hydrolysis goes at an optimum rate at 55°C and pH 7. Addition of 75% of water and 0.2% of the enzyme (w/w) to the hydrolysed raw material was sufficient to obtain a good hydrolysis yield. After 6 h of proteolysis, 1 kg of the raw material yielded 75 g of dry hydrolysate with 78.1% total protein content ( $\text{N} \times 6.25$ ). The nitrogen yield from this raw material amounted to 39.6%. The final product was brown coloured, of good microbiological quality, had no bitter taste and contained a number of mineral compounds. It also revealed good solubility in water but had relatively poor emulsifying properties. It was shown that nutritional quality of the product is limited by sulphur amino acids. AA

1123

Kamat (AS), Alur (MD), Nerkar (DP) and Nair (PM). **Hygienization of Indian chicken meat by ionizing radiation.** *Journal of Food Safety* 12(1); 1991: 59-71

Fresh and frozen chicken (25 samples) were evaluated for total bacterial counts and for pathogens like *Enterobacteria*, *Bacillus cereus*, *Staphylococcus* spp., and *Salmonella* by using appropriate microbiological media. Most of the samples exhibited heavy bacterial contamination ( $1.2 \times 10^5$  -  $2.6 \times 10^6$ /g), mainly with *Staphylococcus* spp. ( $7.5 \times 10^4$  -  $3.6 \times 10^5$  cfu/g). All the chicken samples also showed the presence of *Salmonella* ( $3 \times 10^1$  -  $2.1 \times 10^2$ /g). *Sal. typhimurium* was observed to be present in both fresh as well as frozen chicken samples. The  $D_{10}$  values of *Salmonella* spp., viz. *Sal. typhimurium* and *Sal. seftenberg* in phosphate buffer (pH 7.2) were 0.12 and 0.25 respectively and in chicken homogenate (10%) were 0.25 and 0.60 kGy offering approx. 2-fold protection by the chicken. The results suggest that a dose of 2 kGy is adequate



for normally contaminated chicken samples, but for the heavily contaminated chicken a dose of 4 - 5 kGy, depending upon the predominating *Salmonella* serotype present is required. CSA

## **Broilers**

1124

Sahoo (G) and Shingari (BK). **Effects of floor space on meat quality in commercial broilers.** *Poultry Guide* 29(11): 1992; 39-43

Chicks were reared on 3 types of floors - (i) deep litter (ii) slate and (iii) wire floors upto 8 wks of age. Their body chemical composition, efficiency of nitrogen utilization (ENU) and efficiency of energy utilization (EEU) were determined at 6 or 8 wks. Results indicated that fat contents increased and moisture decreased with the decrease in floor space per bird. ENU increased as the floor space per bird decreased from 930 cm<sup>2</sup>/bird to 465 cm<sup>2</sup>/bird but was adversely affected at 310 cm<sup>2</sup>/bird. EEU was better at 930 cm<sup>2</sup>, 697 cm<sup>2</sup> and 465 cm<sup>2</sup>/bird compared with 310 cm<sup>2</sup>/bird group. Hence, 310 cm<sup>2</sup>/bird on wire floor was considered undesirable for its meat quality. GS

## **Duck**

1125

Wu (C-M) and Liou (S-E). **Volatile components of water-boiled duck meat and Cantonese style roasted duck.** *Journal of Agricultural and Food Chemistry* 40(5): 1992; 838-841

The volatile compounds of water-boiled duck meat, duck fatty tissue, and Cantonese style roasted duck and its gravy were isolated by steam distillation and solvent extraction and then identified by GC and GC-MS, respectively. The major volatiles identified from water-boiled duck meat were the common degradation products of fatty acids except indole, which was identified for the first time in the water-boiled meat. It may be specifically related to duck meat aroma. Cantonese style roasted duck contained most of the volatiles found in duck meat plus pyrazines, pyridines, thiazoles, isoamyl alcohol and phenyl ethyl alcohol. AA

## **Turkeys**

1126

Phebus (RK), Draughon (FA) and Mount (JR). **Survival of *Campylobacter jejuni* in modified atmosphere packaged turkey roll.** *Journal of Food Protection* 54(3): 1991; 194-199

Survival of *Camp. jejuni*, inoculated into turkey roll slices and stored under 7 different atm. mixtures, was determined. Turkey roll samples were stored at 4°C for 18 days and at 21°C for 48 h. The effects of various atm. mixtures on aerobic, psychrotrophic, and lactic acid bacteria populations were also determined throughout storage. *Camp. jejuni* was inactivated under all atm. gas mixtures tested throughout storage. Increasing CO<sub>2</sub> concn. inside the package from 0% to 100% CO<sub>2</sub> resulted in lower rate of inactivation of *Camp. jejuni* at both storage temp. Increases in CO<sub>2</sub> concn. provided greater inhibition of aerobic and psychrotrophic populations as compared to low CO<sub>2</sub> levels. The effect of CO<sub>2</sub> on survival of *Camp. jejuni* and growth rate of aerobic, psychrotrophic, and lactic acid bacteria was more pronounced at 4°C. *Campylobacter* were isolated from inoculated turkey roll held under all atm. by enrichment procedures on the 18th day and 48th h of storage at 4 and 21°C, respectively, with an initial population of log 6.0 *campylobacters*/g. However, no *campylobacters* were isolated by 18 days of storage at 4°C by direct plating. AA

## **Products**

## **Eggs**

1127

Sharma (RR) and Mehta (RK). **Egg quality factors in force-moulted commercial white leghorn hens.** *Poultry Guide* 29(9): 1992; 71-76

Quality factors such as egg size, Haugh units, albumen, yolk and shell contents of eggs were determined for 8 different periods of 28 days duration. Layers fed with diets containing 13% (T<sub>1</sub>), 15% (T<sub>2</sub>) and 17% (T<sub>3</sub>) crude protein (CP). 15% CP based diet was most economical. % albumen content in the 3 treatments was not significantly different but albumen contents of eggs increased significantly with the age. Yolk contents increased significantly with the level of protein in the diet. The av. values of shell and Ca contents were 11.7%, 36.9% in T<sub>1</sub> and 10.9%, 37.3% in T<sub>2</sub> and T<sub>3</sub> respectively. GS

1128

Nidhi and Saxena (UC). **Our health, nutrition and egg.** *Poultry Guide* 29(11): 1992; 65-67

Balanced diet for men and women is indicated grouping food items on the basis of their nutrients. Listing different ways of egg consumption, inclusion of the same in diet as a protective food is emphasised. GS



Brackett (RE) and Beuchat (LR). **Survival of *Listeria monocytogenes* in whole egg and egg yolk powders and in liquid whole eggs.** *Food Microbiology* 8(4): 1991: 331-337

A mixture of 5 strains of *Listeria monocytogenes* was inoculated at 2 populations (approx.  $10^5$  cfu g<sup>-1</sup> and  $10^5$  cfu g<sup>-1</sup>) into commercially dried powdered whole egg (CDPWE), egg yolk (EY) and liquid whole egg (LWE). Inoculated dried egg products was stored at 5 and 20°C for 180 days, LWE was stored at 0 and -18°C for 14 and 168 days. The presence and populations of viable cells were determined periodically throughout storage. All egg products inoculated with  $10^5$  cfu g<sup>-1</sup> yielded viable *Listeria* cells throughout storage. *L. monocytogenes* decreased about 1 and 1.5 log<sub>10</sub> cfu g<sup>-1</sup> in CDPWE and EY respectively, when inoculated with  $10^5$  cfu g<sup>-1</sup> and stored at 5°C. Inactivation occurred more rapidly at 20°C. The number of viable *L. monocytogenes* in frozen LWE initially containing  $10^5$  cfu g<sup>-1</sup> remained unchanged throughout storage. These results indicate that *L. monocytogenes* can survive throughout the normal shelf-life of powdered and frozen egg products. SRA

1130

Gast (RK) and Beard (CW). **Detection and enumeration of *Salmonella enteritidis* in fresh and stored eggs laid by experimentally infected hens.** *Journal of Food Protection* 55(3): 1992: 152-156

Only 3% of the fresh laid eggs and 4% of the eggs stored for 7 days at refrigerator temp. showed presence of *S. enteritidis*. 16% of eggs stored for 7 days at room temp. (25°C) showed *S. enteritidis* contamination. It is concluded that maintaining low temp. during storage and handling of eggs is essential if the expansion of *S. enteritidis* populations in egg contents is to be minimized. BV

## SEAFOODS

1131

Moskowitz (HR). **Importance of sensory factors in processed seafood: Methods and results.** *Journal of Sensory Studies* 7(2): 1992: 147-156

This paper considers the 3 key measures of importance viz. attitudinal importance measures, what consumers think to be important and refers to general opinions about the category; sensory system importance, how strongly different sensory inputs (appearance, aroma etc) drive overall liking and show the key sensory inputs to which consumers

attend; and the attribute level importance, the relation between sensory intensity and overall liking for each attribute. SD

1132

Noah (CW), Perez (JC), Ramos (NC), McKee (CR) and Gipson (MV). **Detection of *Listeria* spp. in naturally contaminated seafoods using four enrichment procedures.** *Journal of Food Protection* 54(3): 1991: 174-177

Four enrichment procedures were evaluated for the recovery of *Listeria* spp. from 211 samples of raw and processed seafoods. The presence of *Listeria* spp. was determined in all 4 methods by a commercial ELISA kit. The enrichments used were 1) *Listeria* enrichment broth (LEB); 2) buffered LEB (BLEB); 3) BLEB transferred to the same enrichment after 24 h (BLEB) 24-h transfer; and 4) modified University of Vermont medium (UVM-1) transferred after 24 h to UVM-1 medium containing additional acriflavin (UVM-2). All 4 enrichments were incubated for a total of 48 h at 30°C. To determine the efficiency of each protocol, the recovery results were compared with those obtained by using a modified version of the Bacteriological Analytical Manual (BAM) cultural method, as described in the Federal Register of November 1, 1988. Statistical analysis showed that recovery of *Listeria* spp. using nonbuffered LEB for 48 h without transfer did not differ significantly from that obtained with the revised BAM method. AA

1133

Price (RJ). **Residue concerns in seafoods.** *Dairy, Food and Environmental Sanitation* 12(3): 1992: 139-143

This review article focuses on metal (As, Cd, Pb, Hg and Se), environmental contaminants (polychlorinated biphenyls, dioxin, polycyclic aromatic hydrocarbons) and chlorinated hydrocarbons pesticide (DDT, dieldrin, chlordane compounds, heptachlor, other pesticides) residues in seafoods. 23 references. SRA

## Crabs

1134

Ripper (TE) and Hackney (CR). **Pasteurization of seafood: Potential for shelf-life extension and pathogen control.** *Food Technology* 46(12): 1992: 88, 90-94

This article focuses primarily on the principles associated with the pasteurization of crabmeat, destruction of pathogens, process considerations (cooling and storage, initial temp., F-value and

shelf-life, spoilage organism, microbial survivors), packaging, process verification, and quality factors (bluing, texture and flavour problems). CSA

## Lobsters

1135

Wang (Z), Taylor (KDA) and Yan (X). **Studies on the protease activities in Norway lobster (*Nephrops norvegicus*) and their role in the phenolase activation process.** *Food Chemistry* 45(2); 1992: 111-116

Three protease separated from Norway lobster (*N. norvegicus*) heads and partially purified were designated as enzymes I, II and III. Enzymes I and II, showing multiple pH optima towards casein and being very similar in most aspects, were likely to be thiol protease. Enzyme III with a pH optimum around 8.2 towards casein was a metal dependent protease and involved in the phenolase activation process in the lobster. SD

## Shrimps

1136

Motes (MLJr). **Incidence of *Listeria* spp. in shrimp, oysters and estuarine waters.** *Journal of Food Protection* 54(3); 1991: 170-173

A total of 227 samples, including oysters, shrimp and water was collected along the U.S. Gulf Coast and examined to determine the presence of *Listeria* spp. *Listeria* spp. were recovered more frequently from shrimp than from water but were not recovered from oysters. Recovery of *Listeria* spp. from shrimp and waters was improved at temp. less than or equal to 20°C; however, recovery was not affected by salinity or related to the fecal coliform standard for shellfish-growing waters. Although only 5% of the test samples were positive for *L. monocytogenes*, all *Listeria* positive shrimp contained *L. monocytogenes*. The incidence of *Listeria* spp. in shrimp was low; nevertheless, shrimp represent a potential source of *Listeria* contamination to processing plants and their products. AA

## Fish

1137

El-Faer (MZ), Rawdah (TN), Attar (KM) and Arab (M). **Mineral and proximate composition of some commercially important fish of the Arabian Gulf.** *Food Chemistry* 45(2); 1992: 95-98

Finfish and shellfish showed 18 - 22% protein and < 3% lipid content. In finfish K was high followed by

P, lower levels of Na, Mg and Ca while in shellfish Na was high. SD

1138

Botta (JR), Kennedy (KM), Kiceniuk (JW) and Legrow (J). **Importance of redfeed level, fish size and roe content to quality of roe capelin.** *International Journal of Food Science and Technology* 27(1); 1992: 93-98

The importance of various levels of redfeed, fish size, roe content, and length of storage at dockside while frozen, and during and after thawing, to the incidence of autolysis of the exterior of the visceral cavity of roe capelin were examined. Evaluations of 106,860 roe-capelin revealed that redfeed level, fish size, and roe content had little effect. The most important factors were frozen storage time and thawing time, followed by length of dockside storage. It was found that this aspect of the quality of roe-capelin could best be improved by reducing the times and temp. to which roe-capelin are exposed prior to freezing, during frozen storage, and during and after thawing. AA

1139

Satyamoorthy (K) and Ramananda Rao (D). **Threonine aldolase in fish muscle.** *Beverage and Food World* 19(4); 1992: 17-19

Threonine aldolase activity in some of the marine and fresh water fishes in fresh form immediately after capture and during low temp. storage were determined. Much variation in the enzymic activity was detected between 'dark' and 'white' muscle, gills, viscera and skin in one and the same species of fish. Effect of heating at various temp., pH, inorganic and organic chemical compounds on the enzymic activity were evaluated. AA

## Catfish

1140

Huang (YW), Lillard (DA), Koehler (PE) and Eitenmiller (RR). **Chemical changes and sensory evaluation of channel catfish as affected by diet, packaging method and frozen storage.** *Journal of Food Quality* 15(2); 1992: 129-138

Fillets, from farm-raised channel catfish (*Ictalurus punctatus*) fed diets with various amounts of protein, were packaged in polyvinylidene chloride (PVDC) film over wrapping, vacuum packaging with Eva bag and vacuum skin packaging and stored at -28°C for 90 days. Neither the packaging nor protein content of diet had a significant effect on thiobarbituric acid and free fatty acid. Sensory analysis showed that



greasiness of cooked catfish was decreased as toughness of fillet texture increased. SD

## Mackerels

1141

Sachindra (NM) and Sripathy (NV). **Effect of preservatives and sterilization of salt on microbiological quality of salted-dried mackerel.** *Indian Journal of Microbiology* 32(4): 1992; 463-468

Use of sodium benzoate and sodium acid phosphate with common salt in the preparation of salted-dried mackerel, does not alter the microbiological quality of fish at the salting stage but helps in reducing the total bacterial load and the staphylococcal count in the dried fish. Staphylococci, however, still remain the dominant flora in the dried fish. Commercial common salt does not seem to be contributory source to the dominant flora on salted-sundried mackerel. RH of storage does not show any significant effect on the microbial load of salted-dried mackerel, irrespective of presence or absence of preservatives. AA

## Saithe

1142

Joly (A), Cottin (P), Han-Ching (L) and Ducastaing (A). **Trimethylamine N-oxide demethylase (TMAO-ase) of saithe (*Pollachius virens*) kidney: A study of some physicochemical and enzymic properties.** *Journal of the Science of Food and Agriculture* 59(2): 1992; 261-267

TMAO-ase, an enzyme of economic importance in the fish industry can produce large amounts of formaldehyde even below freezing point. The resulting formaldehyde-protein interactions induce deleterious effects on the functional properties of frozen fish minces. Results showed differences in some of the physicochemical properties such as T<sub>12</sub>/denaturation and spectrophotometric characteristics (unusual absorption at  $\alpha = 258$  nm, related to the presence of DNA fragments). From structural point of view as evidenced by the elution profiles TMAO-ase activity seems to be constituted of high MW protein groups ( $20 \times 10^6$  and  $2 \times 10^5$ ) closely associated with mixed micelles of phospholipids. BV

## PROTEIN FOODS

1143

Jansen (GR). **Centrally processed weaning foods for use in developing countries.** *Food Reviews International* 8(3): 1992; 307-345

Following a brief introduction to the weaning period, breast-feeding and weaning practices in all regions of the developing world are reviewed. Weaning food developments, including compositional and processing alternatives, are then discussed in the context of nutritional requirements. Particular attention is devoted to various technologies to increase the energy density of weaning foods. Product specifications for weaning foods, as promulgated by the Codex Alimentarius Commission, are presented and discussed. Studies in which supplementary feeding programs have been evaluated are reviewed. The data discussed in this review suggest strongly that the timely introduction of properly prepared weaning foods has an important role to play in improving child survival and growth in developing world. Emphasis in this review is placed on the advantages of centrally processed weaning foods, but clearly home/village-prepared foods also have an important role to play. The review emphasized elementary principles of home sanitation in the proper use of weaning foods. 120 references. BV

## ALCOHOLIC AND NON-ALCOHOLIC BEVERAGES

### Alcoholic beverages

1144

Russell (I) and Stewart (GG). **Contribution of yeast and immobilization technology to flavour development in fermented beverages.** *Food Technology* 46(11): 1992; 146, 148-150

The contribution of immobilized yeast cell technology with diacetyl control in the production of beer and wine used to overcome long fermentation and aging times encountered in traditional brewing and the applications of immobilized yeast in alcohol-free beer and champagne is discussed in this article. CSA

### Beer

1145

Mohan (SB), Smith (L), Kemp (W) and Lyddiatt (A). **An immunochemical analysis of beer foam.** *Journal of the Institute of Brewing* 98(3): 1992; 187-192

Beer foam produced in a continuous foaming tower in volumes representative of commercial dispense, was analysed by immunoelectrophoretic and immunoblotting techniques to identify antigens involved in foam structural stability. In crossed immuno electrophoresis (CIE), only one antigen



precipitated from foam in the homologous foam antiserum. This antigen was shown to be of malt origin by rocket-line immunoelectrophoresis and was also present in 11 commercial beers (5 bitters, 4 lagers and 2 stouts). However, the foam preparation separated into more than 20 polypeptides by SDS polyacrylamide gel electrophoresis. Immunoblotting showed that at least 12 of these reacted with foam antiserum and that they originated from either malt or yeast. Similar polypeptides were also identified in the antigen precipitated in CIE, suggesting that these polypeptides were probably present in the foam as a complex. It is concluded that the stability of foam reflected molecular interactions between these polypeptides (and possibly other components such as carbohydrates) in the liquid film of the bubble structure. AA

1146

St. John Coghlan (D), Woodrow (J), Bamforth (CW) and Hinchliffe (E). **Polypeptides with enhanced foam potential.** *Journal of the Institute of Brewing* 98(3): 1992: 207-213

The ability of beer to produce a good foam is strongly influenced by the level of foam active polypeptides. It has previously been proposed that a means of ensuring an adequate level of such species is to add an exogenous preparation of foam active protein. One such preparation, hydrolysed liquid egg white (HLEW), has been shown to impart a good foam to beer with substandard foam performed, without detriment to product quality. The foam active properties of this material are the subject of the work described. HLEW was characterised by a combination of reverse phase chromatography and polyacrylamide gel electrophoresis to reveal a heterogeneous mixture of low mol. wt. (2100 - 6000 daltons) relatively hydrophilic polypeptides. When this material was subjected to foaming and the foam positive and foam negative fractions similarly characterized, it was apparent that the foam positive fraction consisted almost exclusively of hydrophobic polypeptides. Accordingly, preparative reverse phase chromatography was used to isolate foam active fractions from the hydrophobic species present. These fractions were subsequently subjected to both functional and physical characterisation. It was apparent from a small-scale Rudin test that the foam activity per unit dry wt. of protein was enhanced in the foam active fractions; in one case an enhancement of 2 fold greater than the HLEW itself was observed. Moreover, upon addition to beer a positive effect on HRV was achieved with as little as 0.0025 mg protein/ml beer. Physical characterisation of the foam active material revealed the presence of tightly bound polypeptide aggregates which could only be

separated by the use of protein denaturing agents. AA

1147

Moir (M). **The desideratum for flavour control.** *Journal of the Institute of Brewing* 98(3): 1992: 215-220

Recent progress towards understanding the contributions of raw materials and processing conditions to the aroma and taste of beer is reviewed. 31 references. BV

## Wines

1148

Adsule (RW), Kotecha (PM) and Kadam (SS). **Preparation of wine from pomegranate.** *Beverage and Food World* 19(4): 1992: 13-14

Juice from fresh pomegranate fruits (var. Ganesh) was extracted and fermented using *Saccharomyces cerevisiae* var. *ellipsideus*. The rate of fermentation of juice was slower than that of grape juice. The sensory evaluation of pomegranate wine (PW) showed better colour, taste and less astringency than the grape wine (GW). The cost of production of wine from pomegranate juice (PJ) was relatively higher than that of GW. Considering the good sensory properties of PW and the seasonal glut of pomegranate in the market, fermentation of PJ may open new avenues for better marketing and utilization of pomegranate. BV

## Non-alcoholic beverages

### Cocktails

1149

Bhatia (AK), Singh (RP) and Gupta (AK). **Juice cocktails from tropical fruits and tart apples.** *Beverage and Food World* 16(4): 1992: 22-23

An investigation carried out to explore the possibility of blending tart apple juice with other fruit juices to have acceptable taste and aroma is reported. Results indicate that juice from tart fruits yields an acceptable blend with juice of orange and malta in the ratio of 1:1 and fairly acceptable in the ratio of 1:2. Highly acceptable blends with these fruits were produced after the sugar was adjusted to 14°C Brix. Apple, apricot and apple, dry apricot yield fairly acceptable juice cocktails and provide scope to utilise these fruits for commercial exploitation. BV



## Fruit juices

### Apricot juices

1150

Manan (JK), Kulkarni (SG) and Shukla (IC). **Studies on preparation and storage of pulp, squash, nectar and ready-to-serve beverages from two varieties of apricot (Gola and Chaptta) grown in Kumaon region of Uttar Pradesh.** *Beverage and Food World* 19(4); 1992: 9-12

Ready-to-serve apricot beverage could be prepared from the pulp of 'Gola' and 'Chaptta' (Descendants of 'Royal' and 'Moorpark' var.) var. of apricot which were not fit for table purpose on account of their high acid contents, small size, etc. The RTS beverage with acceptable sensory quality attributes was prepared from pulp preserved by (a) pre-heating (heat processed) and (b) using 547 p.p.m. sulphur-dioxide which is well within the permissible limits. Storage studies on apricot pulp has shown that the pulp quality was satisfactory upto 9 months storage at room temp. (13 - 43°C). Nectars and squashes were also prepared and adjudged satisfactory upto 6 months storage. AA

### Kinnow mandarin juices

1151

Ranote (PS), Saini (SPS) and Bawa (AS). **Evaluation of thermal process and shelf-life of Kinnow juice.** *Journal of Food Science and Technology (India)* 30(2); 1993: 88-91

The slowest heating point was found to be at the geometric centre and at 1/10th of the height from the bottom along vertical axis for pouched and bottled Kinnow juice. The thermal processing time on the basis of pectinmethyl esterase inactivation was 28.3 and 17.0 min for bottles and pouched juice, respectively. Invert sugars increased, while total sugars declined with storage under ambient conditions. Cans, being opaque to light, retained higher amounts of ascorbic acid during storage. Various sensory attributes were significantly affected by types of packaging containers and storage. AA

### Orange juices

1152

Peleg (H), Naim (M), Zehavi (U), Rouseff (RL) and Nagy (S). **Pathways of 4-vinylguaiacol formation from ferulic acid in model solutions of orange juice.** *Journal of Agricultural and Food Chemistry* 40(5); 1992: 764-767

4-Vinylguaiacol (PVG), a major off-flavour in citrus products, was detected in stored model sol. of orange juice (MOJ) containing ferulic acid, and its amount increased with time and temp. PVG was not found in MOJ incubated without ferulic acid. Vanillin, another ferulic acid degradation product, was also detected in MOJ containing ferulic acid after incubation at 35 and 45°C, but only minute amounts occurred at 25°C. Vanillin was not produced, however, in MOJ incubated with added PVG but which did not contain ferulic acid. Incubation of MOJ under nitrogen atm. rather than air or including BHT did not affect PVG levels even though nonenzymic browning products such as 5-(hydroxymethyl)furfural and furfural, and optical density values were reduced. Cu ions accelerated browning but decreased PVG levels. It appears that different factors affect PVG formation and sugar degradation. AA

### Prune juices

1153

van Gorsel (H), Li (C), Kerbel (EL), Smits (M) and Kader (AA). **Compositional characterization of prune juice.** *Journal of Agricultural and Food Chemistry* 40(5); 1992: 784-789

Processed juices from dried prunes with or without pulp, juice from prune conc., and the juices of fresh prune and 9 other fruits were analyzed for anthocyanins, organic acids, sugars, phenolic compounds, and amino acids. Unique characteristics of processed prune juice were the predominance of  $\alpha$ -aminobutyric acid, citrulline, taurine, O-phosphoethanolamine, and quinic acid and the absence of anthocyanins, (-)-epicatechin, phloridizin, and citric and tartaric acids. Comprehensive measurements of sugars, anthocyanins, nonvolatile acids, phenolic compounds, and amino acids made it possible to distinguish processed prune juices from fresh prune juice and the juices of plum, cherry, nectarine, peach, apple, pear, grape, kiwifruit, and strawberry fruits. AA

### Tangerine juices

1154

Noomhorm (A) and Kasemsuksakul (N). **Effect of maturity and processing on bitter compounds in Thai tangerine juice.** *International Journal of Food Science and Technology* 27(1); 1992: 65-72

Optimum conditions of fruit maturity and processing for improved quality of Thai tangerine fruit juice were evaluated. Limonin and naringin components causing bitterness, acidity, total soluble solids and vitamin C were quantified in



specified fruit setting and processing conditions. Higher limonin contents were observed in tangerine fruits harvested early in the season of 1989, whereas naringin contents gradually decreased with maturity. The optimum harvesting time for Thai tangerine fruit which meets the worldwide quality indicators of extracted juice was 9 months after fruit set. Low temp. storage of tangerine juice was only effective in delaying limonin formation if not pasteurized, which results in higher limonin concn. at the start of the storage period. However, naringin concn. of tangerine juice were not affected by storage conditions and the pasteurization process. Lower extraction pressure of juice resulted in low limonin and naringin concn. AA

## Teas

1155

Ohtsuru (M), Nishimura (K), Makita (T), Yayabe (F) and Kakuda (T). **Biochemical examination of the effect of chronic oolong tea consumption in the rabbit.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 38(7); 1991: 626-628 (Ja)

Three groups of rabbits were given water, normal oolong tea or strong oolong tea. There were no significant differences in the various indices for lipid metabolism and those related to the liver and pancreas functions in the blood serum among the groups of animals at 130 days of the experimental period. It was suggested that chronic consumption of oolong tea was in no way harmful at least in this animal species at the dosages employed in the present study. AA

1156

Mahanta (PK) and Baruah (HK). **Theaflavin pigment formation and polyphenol oxidase activity as criteria of fermentation in orthodox and CTC teas.** *Journal of Agricultural and Food Chemistry* 40(5); 1992: 860-863

Depending upon the condition of traditional method of black tea manufacturing, polyphenol oxidase (PPO) activity pigment profiles together with a possible mechanism that could operate during the polyphasic conditions of tea processing were studied simultaneously in 3 types of fermented leaves. Theaflavins, the most desirable pigments having a benzotropolone moiety, and unstable o-quinones, which generated by PPO, were analyzed by HPLC. Furthermore, the oxidation rates of 2 methods of black tea processing, orthodox and curl, tear, crush, were monitored in an oxygraph fitted with a Clark-type electrode, and the role of technology on the quality of the black tea beverage is discussed. AA

1157

Owuor (PO). **Comparison of gas chromatographic volatile profiling methods for assessing the flavour quality of Kenyan black teas.** *Journal of the Science of Food and Agriculture* 59(2); 1992: 189-197

A comparison was made of the relationship between the ratios and sensory evaluation scores of Kenyan clonal CTC black teas and orthodox black teas from different var. GS

## FATS AND OILS

1158

Nice (DJ) and Robinson (DS). **Inhibition of lipid autoxidation by bovine superoxide dismutase.** *Food Chemistry* 45(2); 1992: 99-103

For autoxidation, the initiation reactions, which are supposed to form hydroxyl reactions, are inhibited by superoxide dismutase (SOD) but not the soybean lipoxygenase types I, IV and V in model systems containing linoleic acid. SOD reduced the autoxidation in a low-Fe model system and also inhibits the rapid autoxidation in the presence of haemin. SOD mainly prevents the formation of hydroxyl radicals during the Fe-catalysed oxidation of linoleic acid with the possibility that the enzyme might inhibit haemin-catalysed oxidation by scavenging an oxy-haem complex. SD

## Fats

1159

Sridhar (R), Lakshminarayana (G) and Kaimal (TNB). **Modification of selected Indian vegetable fats into cocoa butter substitutes by lipase-catalyzed ester interchange.** *Journal of the American Oil Chemist's Society* 68(10); 1991: 726-730

A few solid and semi-solid fats of tree origin in India, namely sal (*Shorea robusta*), kokum (*Garcinia indica*), mahua (*Madhuca latifolia*), dhupa (*Vateria indica*) and mango (*Mangifera indica*), were chosen for modification into cocoa butter substitutes by lipase-catalyzed ester interchange with methyl palmitate and/or stearate. Hexane sol. of mixtures of fat and methyl ester(s) in various molar proportions were passed through a column of Lipzyme<sup>TM</sup>, a lipase from *Mucor miehei* immobilized on a macroparticulate ion-exchange resin. The interesterified fats were purified by extraction with 95% ethanol followed by silica column chromatography. Interesterified dhupa, kokum and



sal fats compared well with cocoa butter in the total fatty acid composition and the 2-position of triacylglycerols, as well as glyceride composition. In particular, interesterified kokum fat resembled cocoa butter well in solid fat content and peak melting temp. as determined by differential scanning calorimetry. AA

1160

Kashulines (P), Rizvil (SSH), Harriott (P) and Zollweg (JA). **Viscosities of fatty acids and methylated fatty acids saturated with supercritical carbon dioxide.** *Journal of the Association of Official Analytical Chemists* 68(12): 1991; 912-921

The viscosities of several types of lipids saturated with supercritical carbon dioxide (SC-CO<sub>2</sub>) were measured with a high-pressure capillary viscometer. Oleic acid and linoleic acid were evaluated from 85 to 350 bar at 40 and 60°C. The more SC-CO<sub>2</sub>-soluble methylated derivatives of these fatty acids were evaluated from 90 to 170 bar at 40 and 60°C. The complex mixture of anhydrous milk fat (AMF) was evaluated from 100-310 bar at 40°C. The viscosities of the methylated fatty acids saturated with SC-CO<sub>2</sub> decreased between 5 and 10 times when the pressure increased from 1 to 80 bar, followed by a further decrease by a factor of 2 to 3 when the pressure was increased from 80 to 180 bar. The viscosities of the fatty acids and AMF saturated with SC-CO<sub>2</sub> had viscosity reduction similar to the methylated fatty acids between 1 and 80 bar, but they decreased much less between 80 and 350 bar. At constant pressure, the viscosity of the fatty acids and AMF decreased with increasing temp., whereas the viscosity of the methylated fatty acids increased with increasing temp. The lipid/SC-CO<sub>2</sub> mixtures were Newtonian, and their viscosities were best interpreted by using the mass concn. of dissolved SC-CO<sub>2</sub> in the lipids and the pure component viscosities. AA

1161

Lie (E) and Molin (G). **Esterification of polyunsaturated fatty acids with lipases from different sources.** *International Journal of Food Science and Technology* 27(1): 1992; 73-76

Enzymatically catalyzed esterification between glycerol and polyunsaturated fatty acids were studied for 6 lipases of different biological origin. Most efficient was lipase from *Mucor miehei* (yeast) and *Chromobacterium viscosum* (bacterium) which incorporated free fatty acids in the glycerol to 75% and 80%, respectively. Both lipases showed a slight preference for oleic acid. *M. miehei* lipase incorporated eicosapentaenoic acid at the same level as the acid occurred in the free fatty acid fraction while *C. viscosum* lipase incorporated the acid at a

lesser level. Both lipases esterified less docosaheptaenoic acid. AA

## Oils

1162

Miyashita (K), Kanda (K) and Takagi (T). **A simple and quick determination of aldehydes in autoxidized vegetable and fish oils.** *Journal of the American Oil Chemist's Society* 68(10): 1991; 748-751

A simple and quick method for quantitative aldehyde detn. by using N,N-dimethyl-p-phenylenediamine as reagent is reported. BV

1163

Mukhopadhyay (SB), Gupta (PK) and Basu (AK). **Bleaching of cottonseed and soybean oils by hydrogen generated in situ.** *Journal of the American Oil Chemist's Society* 68(10): 1991; 791

Bleaching of cottonseed and soybean oils has been effected by hydrogen generated *in situ* by the action of aqueous CuSO<sub>4</sub> sol. on Zn dust. Yellow colour bodies are bleached more readily by this process than the red bodies. Colour reduction up to a level of 70 - 74% is attainable by this method. AA

1164

Reynhoul (G). **The effect of temperature on the induction time of a stabilized oil.** *Journal of the Association of Official Analytical Chemists* 68(12): 1991; 983-984

Soybean oil was fortified with the antioxidants BHT, BHA, TBHQ, rosemary extract (Herbalox<sup>R</sup> Seasoning) and tocopherol. Induction times were determined against a control on each sample in a Metrohm Rancimat over a temp. range of 80°C to 180°C. A linear effect of the data was obtained when the log of induction time was plotted against temp. The Metrohm Rancimat was found to be capable of determining induction times within the range of 0.5 to 70 h. AA

## Canola oils

1165

D'Souza (V), deMan (L) and deMan (JM). **Polymorphic behaviour of high-melting glycerides from hydrogenated canola oil.** *Journal of the Association of Official Analytical Chemists* 68(12): 1991; 907-911

Canola oil was hydrogenated with a commercial Ni catalyst at 175°C and 15 psi hydrogen pressure.



Samples were taken during the reaction starting at 15 min and thereafter at 10-min intervals. The reaction was stopped after 2 h. The high-melting glycerides (HMG) were obtained by fractional crystallization at 15°C with acetone as solvent. The HMG were analyzed for fatty acid and triglyceride composition by GLC and *trans* was determined by infrared spectroscopy. In the first 45 min of hydrogenation of canola oil, the 18:0 fatty acid increased at a low rate while the *trans* fatty acid content increased at a much faster rate. The 16:0 and 18:0 content of the HMG was highest and *trans* content the lowest during the period in which the triglyceride composition was the most diverse. The 54-carbon triglyceride content of the HMG increased from 64% to 78% during the 2 h of hydrogenation. The short spacings for the HMG showed the presence of  $\beta$  crystals as well as several intermediate forms. The number of short spacings increased with hydrogenation time. The differential scanning calorimetry (DSC) melting profile of the HMG showed one broad peak between 20 and 30°C and 2 peaks around 60°C and above. Crystallization temp. of the HMG were in the range of 40 - 45°. AA

1166

Ramamurthi (S), Bhirud (PR) and McCurdy (AR). **Enzymatic methylation of canola oil deodorizer distillate.** *Journal of the Association of Official Analytical Chemists* 68(12); 1991; 970-975

Methylation of canola oil deodorizer distillate catalyzed by a nonspecific lipase was investigated. The conversion of fatty acids to methyl esters has been optimized by using a statistical design. Up to 96.5% conversion of fatty acids to their methyl esters has been achieved without the aid of vacuum or any water-removing agent. The effects of temp., ratio of the reactants (methanol:fatty acids in the deodorizer distillate) and enzyme concn. on the equilibrium conversion were studied. The temp. and ratio of the reactants showed a significant effect on the conversion of fatty acids to methyl esters and they exhibited a strong interactive effect. Enzyme concn. in the range of 2.7% to 4.3% did not show a significant effect on the equilibrium conversion of fatty acids. Greater than 95% conversion of fatty acids to methyl esters was achieved at temp. around 50°C and at a ratio of the reactants between 1.8 and 2.0. The inhibitory effect of hydrophilic methanol on the enzyme activity was largely reduced by working at the lower temp. range (around 50°C). AA

#### Coconut oils

1167

Baltasar (SF). **Coconut oil extraction employing the dry processing technology.** *Indian Coconut Journal* 23(3); 1992; 15-17

Various stages (the preparation of raw material, drying or cooking, feeding the expeller presses, handling and filtering of crude oil, oil cooling system and extraction by the solvent method) involved in the extraction of oil from copra by means of mechanical screw presses or the combination of expeller and solvent processes are discussed in this article. CSA

#### Mahua oils

1168

Kotwal (DS), Vali (SA) and Shastri (NV). **Physico-chemical and biological properties of raw and used Mahua oil.** *Journal of Food Science and Technology (India)* 30(2); 1993; 100-104

Groundnut oil (GNO) and Mahua oil (MO) were heated at 180°C for 8 h both with and without intermittent frying of 'fryums' (a commercial ready-to-fry snack). Thermal degradation as measured by changes in colour development, viscosity, smoke point, acid value, peroxide value, iodine value and conjugated diene hydroperoxide values (CDHP) were found to be higher in MO than in GNO. Albino rats of either sex fed on diets with raw MO for a period of three months showed good growth and were found to be comparable to raw GNO diets. Intake of used (heated and fried) MO and GNO adversely affected the food intake and consequently wt. gain of female rats. Rats of either sex fed on heated GNO exhibited normal histology, while heated MO fed rats showed moderate hepatic hypertrophy, with only one rat out of 4 exhibiting unilateral atrophic testicular damage. Fried GNO and MO showed more damage to liver of the male rats, while the kidneys and ovaries of all the rats fed either raw or used GNO and MO depicted normal histological picture. AA

#### Rice bran oils

1169

Sarkar (S) and Bhattacharyya (DK). **Nutrition of rice bran oil in relation to its purification.** *Journal of the Association of Official Analytical Chemists* 68(12); 1991; 956-962

A comparative nutritive study was made to show that the extent of purification markedly influences the nutritive characteristics of rice bran oil. The coeff. of digestibility was 93.8% when rice bran oil that had been purified by degumming, deacidifying, bleaching and deodorizing was fed to rats; whereas it was 94.8% when extremely pure rice bran oil, which was achieved by including an additional dewaxing step, was used. Rice bran oil without deodorization, but purified by other treatments,



showed a 96.2% coeff. of digestibility, which is somewhat lower than that of groundnut oil. However, after a feeding experiment over 3 months, the highly purified rice bran oil showed better results than the other two purified samples of rice bran oil, and was sometimes better than groundnut oil in terms of total lipid, triglyceride and especially in cholesterol content in serum, liver and heart tissues. AA

#### Soybean oils

1170

Endo (Y), Endo (H), Fujimoto (K) and Kaneda (T). **Minor components responsible for flavour reversion of soybean oil.** *Journal of the American Oil Chemist's Society* 68(10): 1991: 769-771

Unusual triglycerides consisting of 10-oxo-8-octadecenoic acid and 10- and 9-hydroxy octadecanoic acids were detected in edible refined, bleached and deodorized, and crude soybean oils which may be responsible for flavour reversion. BV

### SPICES AND CONDIMENTS

#### Essential oils

1171

Ramachandraiah (OS), Azzemoddin (G), Thirumala Rao (SD), Padmakumari (KP) and Narayana (CS). **Composition of essential oil from flower buds of "Nagakesar" (*Mammea longifolia*, Planch).** *The Pafal Journal* 14(1): 1992: 33-34

*Mammea longifolia* Planch (*Clusiaceae*) popularly known as "Nagakesar" is a tree found in South-Western India. Flower buds of Nagakesar on hydro/steam distillation yields 0.8% of essential oils (EO). Extraction of flower buds with n-hexane followed by its steam-distillation of the resulting oleoresin yielded 1.2% of EO. The physico-chemical characteristics of the oil are: sp. gr. 0.9125/30°C, refractive index at 40°C, 1.4870, optically inactive, acid value 0.5, ester value 8.0, evaporation residue 30.4%, soluble in 95% alcohol in 1:1 ratio. The EO is light yellow in colour and has pleasant spicy odour with a warm and sweet aroma. Chemical constituents of the oil identified are: sesquiterpene hydrocarbons (30.56%), guaiene (12.7%), linalool (7.3%), elemol (6.28%),  $\alpha$ -copaene (3.36%),  $\beta$ -caryophyllene (1.39%),  $\alpha$ -pinene (0.92%), camphene (0.41%),  $\beta$ -pinene (0.29%), limonene (0.61%) and p-cymene (0.34%). Dried buds are used as substitutes to cloves in making *pan masala* and extensively used in culinary for fine flavour and aroma in foods and food additives. BV

#### Olives

1172

Tsimidou (M), Papadopoulos (G) and Boskou (D). **Phenolic compounds and stability of virgin olive oil: Part I.** *Food Chemistry* 45(2): 1992: 141-144

Total phenol content and individual phenols of 24 Greek virgin olive oil samples were analysed by reversed phase HPLC. Total polyphenol content and hydroxytyrosol-to-tyrosol ratio showed significant linear correlation with resistance of the oil to autoxidation. Tyrosol the major olive oil phenol did not correlate with the shelf-life. SD

#### Pickles

1173

Oda (N) and Sawada (K). **Use of liquid part of fermented pickles as seasoning liquid and its preservation quality.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 38(8): 1991: 687-690 (Ja)

A liquid part of fermented Kabuzuke was used as seasoning liquid of fresh turnips. The quantity of main organic acids of turnips pickled in this clear liquid for 48 h at 4°C was almost the same of fermented turnips. Colonies of several kinds of bacteria decreased in order from  $10^7$  -  $10^4$  cells/ml to below  $10^2$ /ml after 72 h. When stored at 25°C, turbidity of this clear liquid increased with in short period, but at 4°C, did not increase for a month. In conclusion, this liquid part may be useful as a seasoning liquid of pickle. AA

#### Spices

#### Chillies

1174

Jang (J-J), Devor (DE), Logsdon (DL) and Ward (JM). **A 4-week feeding study of ground red chilli (*Capsicum annum*) in male B6C3F<sub>1</sub> mice.** *Food and Chemical Toxicology* 30(9): 1992: 783-787

The toxicity of red chilli was examined in male B6C3F<sub>1</sub> mice fed a commercial meal diet mixed with ground *Capsicum annum* (Linn.) at levels of 0.5, 1.0, 2.5, 5.0, 7.5 and 10% by wt. Mice were offered control or test diets *ad lib*. starting at 6 wk of age. Food consumption was measured daily and individual body wts. recorded weekly for the 4-wk feeding period. General health, body wt. and food intake were apparently not adversely affected at any level of pepper consumption. Histopathological

evaluation revealed slight glycogen depletion and anisocytosis of hepatocytes in the 10% group. However, other organs did not reveal any lesions attributable to the chilli exposure. It appears that red chilli is relatively non-toxic at the doses tested in male B6C3F<sub>1</sub> mice. AA

## Garlic

1175

Yan (X), Wang (Z) and Barlon (P). **Quantitative estimation of garlic oil content in garlic oil based health products.** *Food Chemistry* 45(2); 1992: 135-139

Three major sulphides (diallyl disulphide, allyl methyl trisulphide and diallyl trisulphide) contributing about 600 mg g<sup>-1</sup> in the oil were analysed by a GLC procedure using C<sub>18</sub> cartridge liquid solid phase extraction. The garlic oil based health products showed a very similar sulphide profile to that of pure oil and so that the oil content in these products were estimated by relating individual sulphide wt. % in the products to their composition in the oil. The estimation is useful to check the manufacturer's oil content claims. SD

## Marjoram

1176

Komaitis (ME), Ifanti-papatragianni (N) and Melissari-Panagiotou (E). **Composition of the essential oil of marjoram (*Origanum majorana* L.).** *Food Chemistry* 45(2); 1992: 117-118

A total of 45 compounds were identified by GLC and GC-MS analysis; the most prominent being 4-terpineol (37%) and three other substances firstly in the marjoran oils. SD

## SENSORY EVALUATION

1177

Wakeling (IN), Raats (MM) and Mactie (HJH). **A new significance test for consensus in generalized procrustes analysis.** *Journal of Sensory Studies* 7(2); 1992: 91-96

Generalised Procrustes Analysis, used to assess the sensory panel consensus and to which is fit goodness of fit based on Monte-Carlo simulations, has been modified into a more powerful test and also in a way to retain the original assessor configurations by permutation of data rows. SD

1178

Piggott (JR) and Watson (MP). **A comparison of free-choice profiling and the repertory grid method in the flavour profiling of cider.** *Journal of Sensory Studies* 7(2); 1992: 133-145

A group of trained and untrained assessors described the sensory properties of 25 ciders. Generalised Procrustes analyses of the two data sets provided broadly similar results but the repertory grid method yielded more descriptors and interpretation of the resulting product space was slightly easier. The methods were only comparable. SD

1179

Lundahl (DS). **Comparing time-intensity to category scales in sensory evaluation.** *Food Technology* 46(11); 1992: 98-103

Study evaluating strawberry juice for sweetness, sourness, bitterness and astringency found that time-intensity measurements provided more information on sample differences than category scaling. CSA

1180

Cardello (AV) and Sawyer (FM). **Effects of disconfirmed consumer expectations on food acceptability.** *Journal of Sensory Studies* 7(4); 1992: 253-277

Three studies were conducted to assess the effects of disconfirmed consumer expectation on food acceptability. In the first, disconfirmed expectations for the sensory attributes of an edible film had a negative effect on acceptability of the film. Greater disconfirmation resulted in lower acceptance and purchase intent. In the second study, written product information was used to establish 3 levels of expected acceptability and expected bitterness for a novel fruit beverage. Comparison of preexposure (expected) and postexposure (perceived) ratings of acceptability and bitterness supported an assimilation model of disconfirmation effects for conditions in which expectations of acceptability were high and expectations of bitterness were low. A contrast effect was observed for bitterness judgements when expectation of bitterness were high. Associative effects resulting from the expectation manipulation were observed on other sensory attributes. In the third study, expectation were manipulated to influence both direction (positive versus negative) and degree of disconfirmation for the acceptance of cola beverages. Results provided further support for an assimilation model of these effects. AA



1181

Cliff (M) and Heymann (H). **Descriptive analysis of oral pungency.** *Journal of Sensory Studies* 7(4); 1992; 279-290

Four pungent qualities viz. burning, tingling, numbing, overall, two temporal qualities viz., lag time, overall duration and three spatial qualities viz., longitudinal location, lateral location, localized/diffuse of pungent principles viz., capsiacin, piperine, cinnamaldehyde, cuminaldehyde, having quick onset and rapid decay, was primarily burning and tingling; that of eugenol, a long-lasting predominantly numbing effect; that of piperine, capsaicin and ginger, having different temporal and spatial responses, primarily burning; that of ethanol, having the shortest perceived onset and overall duration, most diffuse and that of cuminaldehyde equally burning, tingling and numbing. SD

1182

Irwin (RJ), Hautus (MJ) and Stillman (JA). **Use of the receiver operating characteristic in the study of taste perception.** *Journal of Sensory Studies* 7(4); 1992; 291-314

The review on receiver operating characteristic (ROC) for taste confirms that its model is normal-normal equal variance of signal detection theory. Standard error of ROC parameters is useful since taste test trials are always a small number. Methods for estimating standard errors and area measure PCA are also presented. 33 references. SD

## FOOD STORAGE

1183

Agarwal (US) and Gupta (DK). **Change in weight of stored agricultural products due to change in moisture content.** *Bulletin of Grain Technology* 29(2); 1991; 108-112

Appropriate formulae and ready reckoners developed for estimating the wt. change and the changed wt. of the agricultural products for moisture variations of 7 - 20% (wb), are presented. Agricultural marketing, processing and storage agencies can make use of the same. GS

## INFESTATION CONTROL AND PESTICIDES

1184

Khanna (SC) and Yadav (TD). **Ovicidal efficacy of methyl bromide and phosphine against insect**

**pests of stored products.** *Bulletin of Grain Technology* 29(2); 1991; 79-83

Ovicidal efficacy of methyl bromide (MB) and phosphine against 24 - 48 h old eggs of *Ephestla cautella* (Walk), *Corcyra cephalonica* (Staint), *Trogoderma granarium* (Everts), *Callosobruchus maculatus* (Fab), *C. chinensis* (Linn.) and 0 - 48 h old eggs of *Sitophilus oryzae* (L) was tested. *C. chinensis* proved most susceptible to both the fumigants; *E. cautella* least to MB and *Cor. cephalonica* least to phosphine. GS

1185

Chiranjeevi (CH). **Efficacy of some indigenous plant materials and ashes on the percentage of damaged grains, percentage of protection and viability of green gram seed infested by pulse beetle *Callosobruchus chinensis* (L.).** *Bulletin of Grain Technology* 29(2); 1991; 84-88

Efficacy of leaf powders of neem (*Azadirachta indica*), apamarga (*Achyranthus aspera*, kesarachettu (*Crinum defixum*), lantana (*Lantana camara*), rhizome powder of sweet flag (*Acorus calamus*), seed powder of neem, ashes of cowdung, acacia wood, neem wood and casuarina on the % of protection and viability of treated seed, was studied. Cowdung ash was most effective in damage reduction and infestation over control, followed by neem seed powder, sweet flag rhizome powder and neem leaf powder. Treatments did not affect seed germination. GS

## BIOCHEMISTRY AND NUTRITION

1186

Dodd (NS) and Swaroop Dighe. **Iodine content of diets of the people of different regions living in Bombay.** *Journal of Food Science and Technology (India)* 30(2); 1993; 134-136

Total daily iodine intake of 100 women from ten different regions, living in Bombay, ranged from 211 - 301 meg. Nearly 15.3 - 42.0% of iodine was contributed by the daily salt intake. Iodine losses during cooking ranged from 37.4 - 69.7%. AA

1187

Collier (PD), Cromie (DDO) and Davies (AP). **Mechanism of formation of chloropropanols present in protein hydrolysates.** *Journal of the American Oil Chemist's Society* 68(10); 1991; 785-790

Chloropropanols are formed in protein hydrolysates by the reaction of the HCl acid with residual lipids



associated with the proteinaceous materials used in their production. The products formed from triolein, glycerol,

1,2-diacyl-sn-glycero-3-phosphorylcholine and soya meal have been analyzed by thin-layer and GC. The yields and isomer ratios of the chloropropandiol and dichloropropanols formed are interpreted in terms of reaction mechanisms for their formation, which involve preferential nucleophilic substitution by the chloride anion at positions activated by neighboring ester groups. These provide anchimeric assistance and govern regioselectivity through steric and electronic effects. AA

1188

Martinez (VM), Newman (RK) and Nenman (CW). **Barley diets with different fat sources have hypocholesterolemic effects in chicks.** *Journal of Nutrition* 122(5); 1992: 1070-1076

Broiler chicks were fed isonitrogenous diets containing 23% protein, 11.4% dietary fibre and 10% dietary fat for 17 days. Diets contained 60% hull-less barley or red spring wheat, with either palm oil, dehydrated egg yolk, butter, tallow or corn oil. Wheat-fed chicks grew faster, showed greater food efficiency and higher liver cholesterol concn. Barley-fed chicks showed lower total plasma cholesterol concn. (3.1 - 4.0 mmol/L), higher fecal crude fat and lower excreta DM. Chicks fed palm oil with wheat showed the highest total cholesterol, 11.3 mmol/L. High soluble fibre of barley was found to exert a hypocholesterolemic effect in chicks irrespective of dietary fat source, possibly mediated through lowered fat absorption. SD

1189

Nakamura (S), Kato (A) and Kobayashi (K). **Bifunctional lysozyme - galactomannan conjugate having excellent emulsifying properties and bactericidal effect.** *Journal of Agricultural and Food Chemistry* 40(5); 1992: 735-739

Lysozyme-galactomannan conjugate prepared through controlled Maillard reaction revealed excellent emulsifying properties and antimicrobial properties. The lytic activity of the conjugate remained about 80% that of native lysozyme when measured by using *Micrococcus lysodeikticus* as a substrate. The emulsifying properties of the conjugate were superior to those of commercial emulsifiers. The emulsifying activity and stability of the lysozyme-galactomannan conjugate were not affected in the presence of 0.2 M NaCl and in acidic pH, while those of commercial emulsifiers were decreased. In addition, the lysozyme-galactomannan conjugate exhibited a

lethal antimicrobial effect against Gram-negative bacteria. AA

1190

Decker (EA), Crum (AD) and Calvert (JT). **Differences in the antioxidant mechanism of carnosine in the presence of copper and iron.** *Journal of Agricultural and Food Chemistry* 40(5); 1992: 756-759

Carnosine is a  $\beta$ -alanythistidine dipeptide found in skeletal muscle. Carnosine (1.0 - 25 mM) is capable of inhibiting Cu- and Fe-catalyzed oxidation of phosphatidylcholine liposomes as measured by thiobarbituric acid reactive substances (TBARS) and lipid peroxides. The ability of 5 mM carnosine to inhibit the formation of TBARS and lipid peroxides and lipid peroxides was 2.5- and 8.8-fold higher, respectively, for Cu- than Fe-catalyzed lipid oxidation. Carnosine (0.05 - 10.0 mM) is capable of inhibiting Cu-catalyzed oxidation of ascorbic acid but was ineffective at preventing Fe-catalyzed ascorbate oxidation. Carnosine inhibits Fe-dependent microsomal lipid oxidation but does not inhibit the oxidation of NADPH by the enzyme system.  $^1\text{H}$  NMR spectra of carnosine show peak broadening in the presence of Cu but not Fe. These data suggest that carnosine forms a complex with Cu which decreases its catalytic activity; however, carnosine does not form a complex with Fe. AA

1191

Hardinge (F) and Hardinge (M). **The vegetarian perspective and the food industry.** *Food Technology* 46(10); 1992: 114, 116, 121

Research on vegetarian diets based on nutrient groups (protein, animal fat, cholesterol and dietary fiber) and large-scale studies, the response of the food industry to the research and the challenges to be faced by the food industry are the aspects dealt in this article. CSA

1192

Nestel (PJ). **How does the fat we eat affect our risk of heart disease ?.** *Food Australia* 44(8); 1992: 377-378

This review summarizes the evidence and proposes the optimal dietary mix. Aspects covered include, dietary fat (amount, type of fat), dietary cholesterol, fat soluble antioxidants, and recommendations. 6 references. SRA

1193

Mills (ENC), Alcocer (MJC) and Morgan (MRA). **Biochemical interactions of food-derived**



The structural aspects of peptide chemistry and its application to the study of food-derived peptides are reviewed. Physiologically active peptides, their immunogenicity, enzyme-linked immunosorbent assays are covered with reference to food intolerance. 20 references. GS

## TOXICOLOGY

1194

Houben (GF), Abma (PMH), Van Den Berg (H), Van Dokkum (W), Van Loveren (H), Penninks (AH), Seinen (W), Spanhaak (S), Vos (JG), Ockhuizen (Th). **Effects of the colour additive caramel colour III on the immune system: A study with human volunteers.** *Food and Chemical Toxicology* 30(9): 1992; 749-757

Administration of the colour additive Caramel Colour III to rats has been associated with decreased numbers of lymphocytes and several other changes in the immune system, as well as in immune function parameters, specifically in animals fed a diet with a relatively low vitamin B<sub>6</sub> content. The effects are caused by the imidazole derivative 2-acetyl-4(5)-tetrahydroxybutylimidazole (THI). Caramel Colour III is commonly used in food products such as bakery products, soybean sauces, brown sauces, gravies, soup aromas, brown (dehydrated soups, brown malt caramel blend for various applications, vinegars and beers, and effects in humans on dietary intake cannot be excluded. Elderly male volunteers with a marginal deficit in vitamin B<sub>6</sub> were considered a relevant and potentially sensitive group to study possible effects of Caramel Colour III on blood lymphocyte numbers (total and within subsets) or on proliferative responses of lymphocytes to mitogenic stimulation. In addition, several other haematological parameters, as well as serum immunoglobulin levels and immunoglobulin production *in vitro* by pokeweed mitogen-stimulated mononuclear blood cells were studied. The results of this double-blind intervention study demonstrated that in a selected test group of apparently healthy elderly male volunteers with a biochemically marginally deficient vitamin B<sub>6</sub> status, Caramel Colour III containing 23 (commercial sample) or 143 (research sample) p.p.m. THI and administered at the level of the current acceptable daily intake of 200 mg/kg body wt./day for 7 days did not affect any of the factors investigated. AA

1195

Loprieno (G), Boncristiani (G) and Loprieno (N). **Genotoxicity studies *in vitro* and *in vivo* on carminic acid (Natural Red 4).** *Food and Chemical Toxicology* 30(9): 1992; 759-764

The potential genotoxic activity of carminic acid (CAS no. 1260-17-9; EINECS no. 215-023-3; C.I. no. 75410), a component of natural red colouring products (cochineal: CAS no. 1343-78-8; EINECS no. 215-680-6; C.I. no. 75470), used in food, cosmetics and drugs, has been evaluated by means of a series of short-term tests *in vitro* and *in vivo*, namely Salmonella reverse mutation, chromosome aberrations and sister chromatid exchanges *in vitro* on Chinese hamster ovary cells, and the mouse micronucleus test. All studies have produced negative results. The data obtained strongly support the non-mutagenic/non-carcinogenic activity of this compound. Genotoxicity data previously obtained for carminic acid, concerning the induction of a series of other genetic endpoints in different test systems, have also been considered, as have recent findings that indicate lack of carcinogenic activity in the cochineal preparation containing 29.8% carminic acid. AA

1196

Sternitzke (A), Legrum (W) and Netter (KJ). **Effects of phenolic smoke condensates and their components on hepatic drug metabolizing systems.** *Food and Chemical Toxicology* 30(9): 1992; 771-781

Treatment of food with wood smoke is a long-established methods of preservation and flavouring food. Recently, hardwood smoke condensates, purified of polycyclic hydrocarbons, have become of importance for direct flavouring of sausage-meat. The acute toxicity of the purified phenolic fraction in mice after intraperitoneal administration was therefore investigated. The LD<sub>50</sub> was found to be 940 mg/kg body wt., which is about 3 times the LD<sub>50</sub> of phenol (about 300 mg/kg). Only high concn. of phenols or smoke condensate fractions are able to damage cytochrome P-450 by conversion to cytochrome P-420, whereas lower concn. exhibit inhibitory effects on monooxygenase activity. Inductive properties of the phenolic fractions could not be demonstrated. Concn. *in vivo* of free phenolic compounds do not reach inhibitory levels, since the hexobarbital-induced sleeping-time and <sup>14</sup>CO<sub>2</sub>-exhalation after administration of p-[methoxy-<sup>14</sup>C] acetanilide are not altered. It is concluded that the phenolic compound intake with food regularly treated with smoke condensate fractions is below a toxicologically relevant level. AA

## FOOD LAWS AND REGULATIONS

Nil





# AUTHOR INDEX

- Abma (PMH)  
1194
- Abou-Zeid (NA)  
1076
- Abuin (SP)  
964
- Adsule (RW)  
1148
- Agarwal (US)  
1183
- Ahmed (AM)  
996
- Alcocer (MJC)  
1193
- Alexander (AV)  
1068
- Alley (G)  
1115
- Alur (MD)  
1123
- Amarkeet Kaur  
1041
- Andersen (HJ)  
1114
- Anjaneyulu (ASR)  
1106
- Arab (M)  
1137
- Arun Kilara  
1066
- Arvind Raman  
1051
- Arya (SS)  
1040
- Aselage (J)  
1035
- Ashenafi (M)  
997 1017
- Attar (KM)  
1137
- Awasthi (MD)  
1033
- Azzemoddin (G)  
1171
- Baer (RJ)  
1087
- Bajaj (M)  
1043
- Baker (RL)  
1102
- Balaban (MO)  
973
- Balachandran (R)  
1063
- Balakrishnan (N)  
1044
- Baltasar (SF)  
1167
- Bamforth (CW)  
1146
- Barai (BK)  
1103
- Barbano (DM)  
1072
- Barbeau (W)  
1015
- Bargale (PC)  
1018
- Barlon (P)  
1175
- Barnes (DL)  
1086
- Baruah (HK)  
1156
- Basha (SM)  
1007
- Bastian (ED)  
1059 1071
- Basu (AK)  
1163
- Bawa (AS)  
1151
- Beard (CW)  
1130
- Begum (J)  
1116
- Benedict (RC)  
976
- Beuchat (LR)  
1129
- Bharathi (P)  
1032
- Bhatia (AK)  
1149
- Bhattacharyya (DK)  
1169
- Bhavadasan (MK)  
1089
- Bhilegoankar (KN)  
1105
- Bhirud (PR)  
1166
- Bhoner (HF)  
1060
- Bhupinder Singh  
1041
- Bigelis (R)  
986
- Blank (G)  
1075
- Bodyfelt (FW)  
1074 1086
- Boncrisiani (G)  
1195
- Bonhomme (J)  
1104
- Bonorden (WR)  
998
- Boskou (D)  
1172
- Botta (JR)  
1138
- Brackett (RE)  
1129
- Brown (RJ)  
1059 1071 1077
- Buera (MP)  
968
- Busse (M)  
1017
- Buttery (RG)  
1026
- Calvert (JT)  
1190
- Cantwell (MI)  
1026
- Cardello (AV)  
1180
- Carpenter (JA)  
1119
- Cash (JN)  
966
- Chain (VS)  
972 974
- Chauhan (BM)  
1016
- Chen (S-Y)  
1031
- Chen (ZY)  
1061
- Chengappa (PG)  
1038 1039
- Chiranjeevi (CH)  
1185
- Choudhari (AC)  
1036
- Christiansen (LN)  
1102

Chyau (C-C)  
 1031  
 Cliff (M)  
 1181  
 Collard-Bovy (C)  
 1067 1090 1093  
 Collier (PD)  
 1187  
 Correia (LR)  
 1100 1101  
 Cottin (P)  
 1142  
 Cotton (LN)  
 1053  
 Cours (D)  
 1115  
 Cromie (DDO)  
 1187  
 Crum (AD)  
 1190  
 Cuero (RG)  
 994  
 D'Souza (V)  
 1165  
 Daniel (JW)  
 1000  
 Das (H)  
 1023  
 Datta (AK)  
 959  
 Daufin (G)  
 1084  
 Davey (CL)  
 971  
 Davies (AP)  
 1187  
 Decallonne (J)  
 975  
 Decker (EA)  
 1190  
 Delhaye (S)  
 965  
 Delmee (M)  
 975  
 deMan (JM)  
 1165  
 deMan (L)  
 1165  
 Demeryer (D)  
 1115  
 Deosthale (YG)  
 1009  
 Desikachar (HSR)  
 993  
 Devor (DE)

1174  
 Dhindsa (KS)  
 999 1020  
 Dodd (NS)  
 1186  
 Dodds (KL)  
 1096  
 Doi (T)  
 1058  
 Dommett (TW)  
 1069  
 Doyle (MP)  
 1048  
 Draughon (FA)  
 1126  
 Ducastaing (A)  
 1142  
 Duheille (J)  
 1067 1090 1093  
 Dwivedi (SL)  
 1008  
 Eitenmiller (RR)  
 1140  
 El Bari (N)  
 1093  
 El Lioui (M)  
 975  
 El-Faer (MZ)  
 1137  
 El-Gazzar (FE)  
 1060  
 Endo (H)  
 1170  
 Endo (Y)  
 1170  
 Ernststrom (CA)  
 1059  
 Etherington (DJ)  
 1099  
 Fanelli (C)  
 979  
 Fernandez-Salguero (J)  
 961  
 Fernando (SY)  
 973  
 Fik (M)  
 1122  
 Forsythe (RH)  
 1094  
 Fujimoto (K)  
 1170  
 Fung (DYC)  
 972 974 1019  
 Furihata (K)  
 1013

Gaafar (AM)  
 1088  
 Galhotra (KK)  
 1079  
 Galvez (FCF)  
 1002  
 Gandara (JS)  
 964  
 Gandemer (G)  
 1109  
 Garcia (MG)  
 1029  
 Garcia-Garibay (M)  
 1054 1055  
 Garg (SK)  
 1070  
 Garner (JOJr)  
 1024  
 Gast (RK)  
 1130  
 Gaur (MK)  
 1038  
 Gibbons (RJ)  
 951  
 Gibson (LL)  
 1108  
 Gill (CO)  
 1097  
 Gillett (RAN)  
 1119  
 Giner (V)  
 1029  
 Gipson (MV)  
 1132  
 Glass (KA)  
 1048  
 Gomez (R)  
 961  
 Gonzalez (AR)  
 1035  
 Gothwal (PP)  
 1089  
 Grau (FH)  
 1098  
 Grazier (CL)  
 1074  
 Grewal (RB)  
 1016  
 Grimmer (HR)  
 995  
 Gunasekaran (P)  
 1021  
 Guntert (M)  
 991



Gupta (AK)	1011	Kadam (SS)
1149	Hopp (R)	1148
Gupta (DK)	991	Kader (AA)
1183	Horgan (DJ)	1153
Gupta (PK)	1107	Kaimal (TNB)
1163	Houben (GF)	1159
Gupta (RC)	1194	Kakegawa (R)
1057	Hu (W)	1014
Gurtu (S)	959	Kakuda (T)
1008	Huang (YW)	1155
Gutierrez-Duran (M)	1140	Kalra (R)
1054 1055	Humbert (G)	1028
Hackney (CR)	1067 1090 1093	Kamat (AS)
1134	Hung (SC)	1123
Hamada (JS)	1111	Kamisoyama (H)
963	Ifanti-papatrangianni (N)	1110
Han-Ching (L)	1176	Kanawjia (SK)
1142	Irwin (RJ)	980 1083
Hansen (KG)	1182	Kanda (K)
1071	Islam (MR)	1162
Hansen (M)	1116	Kandewade (VL)
1026	Ismond (MAH)	1003
Haq (S)	1006	Kaneda (T)
1116	Ito (T)	1170
Hardinge (F)	1110	Kang (JO)
1191	Jain (KK)	1110
Hardinge (M)	1051	Kansal (VK)
1191	Jalil (MA)	1056
Haridas Rao (P)	1116	Kantharaj Urs (M)
1042 1046	Jambunathan (R)	1005
Harlfinger (L)	1008	Kanzaki (M)
952	Jana (AH)	1058
Harper (SJ)	1080	Karel (M)
1086	Janardhana Reddy (M)	968
Harriott (P)	979	Karkare (UD)
1160	Janave (MT)	1105
Hassan (HN)	1030	Karmas (R)
1091	Jang (J-J)	968
Hautus (MJ)	1174	Kasemsuksakul (N)
1182	Jansen (GR)	1154
Hayakawa (I)	1143	Kashulines (P)
1110	Jayaprakasha (HM)	1160
Hearnsberger (JO)	1064	Kato (A)
1024	Jensen (LH)	1189
Hedger (JN)	1068	Kaur (A)
971	Jeremiah (LE)	1043
Hemanta Kumar (NG)	1097 1108	Kaur (H)
1038 1039	Joly (A)	967
Heymann (H)	1142	Kawatra (BL)
1181	Jones (PN)	967
Higashi (K)	1107	Kell (DB)
1014	Jones (SDM)	971
Hinchliffe (E)	1108	Kemp (W)
1146	Jonnalagadda (SS)	1145
Holloway (RK)	1015	

Kennedy (KM)	1106	Mahia (PL)
1138	Lakshminarayana (G)	964
Kerbel (EL)	1159	Makita (T)
1153	Lambert (AD)	1155
Khanna (R)	1096	Manan (JK)
980	Lambert (R)	1150
Khanna (SC)	975	Marchal (E)
1184	Landry (J)	1067 1090 1093
Khurdiya (DS)	965	Marmer (BS)
1034	Legrow (J)	976
Kiceniuk (JW)	1138	Marshall (VME)
1138	Legrum (W)	1055
Kinde (H)	1196	Marshall (VMF)
1068	Leseigneur-Meynier (A)	1054
King (NL)	1109	Marth (EH)
1107	Li (C)	977 1060
Klein (BP)	1153	Martinez (A)
1025	Lie (E)	1029
Kobayashi (K)	1161	Martinez (VM)
1189	Lillard (DA)	1188
Kochar (GK)	1140	Matsumoto (K)
992	Linden (G)	1058
Koehler (PE)	1067 1090 1093	Mauromoustakos (A)
1140	Ling (LC)	1035
Kohyama (K)	1026	McCarthy (S)
1012	Liou (S-E)	978
Komaitis (ME)	1125	McCurdy (AR)
1176	Litchfield (JB)	1166
Kondaiah (N)	960	McDaniel (MR)
1106	Logsdon (DL)	1074 1086
Kotecha (PM)	1174	McEvily (AJ)
1148	Longvah (T)	989
Kotwal (DS)	1009	McGrath (RM)
1168	Loprieno (G)	995
Kozaki (M)	1195	McKee (CR)
970	Loprieno (N)	1132
Krishna Jha	1195	Mcguire (J)
1018	Losada (PP)	956
Kulkarni (CY)	964	Mehta (RK)
1032	Lozano (JS)	1127
Kulkarni (PR)	964	Melissari-Panagiotou (E)
969 990 1103	Lundahl (DS)	1176
Kulkarni (SG)	1179	Merrill (RK)
1150	Lyddiatt (A)	1077
Kurth (LB)	1145	Michel (F)
1107	Ma (S)	1084
Kuypers (R)	1024	Mills (ENC)
1107	Mactie (HJH)	1193
Labbe (J-P)	1177	Minhas (KS)
1084	Maga (JA)	1041
Lacey (J)	1022	Misra (AK)
979	Mahanta (PK)	1065 1078
Lakritz (L)	1156	Misra (SK)
1120	Maharaj Narain	1049
Lakshmanan (V)	1003	



Mistry (VV)	1061	Padmakumari (KP)
1091	Nayak (RR)	1171
Mital (BK)	990 1103	Padmanabha Reddy (V)
1070	Nellaiah (H)	1081 1082
Mittal (GS)	1021	Panda (B)
1100 1101	Nenman (CW)	1117
Miyashita (K)	1188	Papadopoulos (G)
1162	Nerkar (DP)	1172
Mohamed Habibulla Khan (M)	1123	Paramjyothi (S)
1081 1082	Nestel (PJ)	1004
Mohan (SB)	1192	Parbhoo (V)
1145	Netter (KJ)	995
Moir (M)	1196	Parrott (DL)
1147	Newall (WCJr)	954
Molin (G)	1036	Partap (PS)
1161	Newman (RK)	1020
Montagne (P)	1188	Patel (AA)
1067 1090 1093	Nice (DJ)	1050
Morgan (MRA)	1158	Patel (HC)
1193	Nidhi	1080
Morton (ID)	1128	Patel (RK)
1000	Nigam (SN)	983
Moskowitz (HR)	1008	Patel (RS)
1131	Nirankar Nath	1064
Motes (MLJr)	1028	Patil (CV)
1136	Nishimura (K)	1032
Mount (JR)	1155	Pedraza (G)
1126	Nishinari (K)	1055
Mounts (TL)	1012	Peleg (H)
1011	Noah (CW)	1152
Moyes (LV)	1132	Penaloza (W)
1077	Noomhorm (A)	971
Mukhopadhyay (SB)	1154	Penninks (AH)
1163	Oberg (CJ)	1194
Mulimani (VH)	1077	Peplow (AJ)
1004	Ockhuizen (Th)	973
Murugkar (HV)	1194	Perez (JC)
1095	Oda (N)	1132
Nagaraju (T)	1173	Perry (AK)
1005	Ohtsuru (M)	1025
Nagodawithana (T)	1155	Phebus (RK)
985	Okubo (A)	1126
Nagy (S)	1013	Piggott (JR)
1152	Onodenalore (AC)	1178
Naim (M)	1121	Pillai (RAV)
1152	Onwuzulu (OC)	1082
Nair (PM)	1027	Pillaiyar (P)
1123	Opdahl (LJ)	993
Nakamura (S)	1087	Poll (JK)
1189	Osuji (GO)	1085
Nakao (Y)	994	Ponte (GJ)
962	Owens (LS)	1045
Narayana (CS)	1068	Potty (VH)
1171	Owuor (PO)	950
Nawar (WW)	1157	

Prakash (V)  
1010  
Prasad (SR)  
1050  
Pratt (CA)  
1015  
Price (RJ)  
1133  
Prokakis (G)  
1035  
Quemerais (A)  
1084  
Raats (MM)  
1177  
Radha Iyengar  
989  
Raghunath (K)  
1008  
Rahim (A)  
1047  
Ram Gopal  
1118  
Ram (T)  
999  
Ramachandraiah (OS)  
1171  
Ramamurthi (S)  
1166  
Ramana (KVR)  
1027  
Ramananda Rao (D)  
1139  
Ramirez (L)  
1029  
Ramos (NC)  
1132  
Ranote (PS)  
1151  
Rao (KVSS)  
1063  
Rasmussen (MA)  
1114  
Rasmussen (RR)  
1072  
Ravi (PC)  
1039  
Rawdah (TN)  
1137  
Reade (L)  
987  
Reddy (GV)  
1023  
Renerre (M)  
1104  
Renner (E)

1064  
Resurreccion (AVA)  
1002  
Revah-Moiseev (S)  
1054 1055  
Reynhoul (G)  
1164  
Richardson (GH)  
1077  
Ripper (TE)  
1134  
Rizvil (SSH)  
1160  
Robertson (WM)  
1108  
Robinson (DS)  
1158  
Rodrigo (M)  
1029  
Romero (DA)  
984  
Rouseff (RL)  
1152  
Russell (I)  
1144  
Sabharwal (P)  
1015  
Sachdev (AK)  
1118  
Sachindra (NM)  
1141  
Safon (J)  
1029  
Sahoo (G)  
1124  
Saini (SPS)  
1151  
Sajilata (M)  
969  
Santerre (CR)  
966  
Sarkar (S)  
1049 1065 1169  
Sastry (SK)  
957  
Satoh (K)  
1058  
Satyamoorthy (K)  
1139  
Sawada (K)  
1173  
Sawyer (FM)  
1180  
Saxena (UC)  
1128

Schiffmann (RF)  
958  
Schlegel (W)  
953  
Schmidt (DG)  
1085  
Schmidt (KA)  
1092  
Schmidt (SJ)  
960  
Schrader (GW)  
960  
Schroeder (JM)  
1102  
Seetha Kannan  
1008  
Seghal (S)  
1001  
Seiler (H)  
981  
Seinen (W)  
1194  
Seshadri (CV)  
988  
Shahani (KM)  
1052  
Shahidi (F)  
1121  
Shamsuzzaman (K)  
1075  
Shaparis (AB)  
1102  
Sharma (A)  
1001  
Sharma (GP)  
1062  
Sharma (KK)  
992  
Sharma (RR)  
1127  
Shastri (NV)  
1168  
Shekara Shetty (H)  
979  
Sherikar (AT)  
1095 1105  
Shigemori (S)  
1110  
Shingari (BK)  
1124  
Shirai (K)  
1054 1055  
Shrupalekar (SR)  
1047



Shukla (IC)	1196	Tsimidou (M)
1150	Stewart (GG)	1172
Sidhu (JS)	1144	Tuitemwong (K)
1041 1043	Stillman (JA)	1019
Silva (JL)	1182	Umesh (BV)
1024	Subramaniyan (V)	988
Sindhu Kanya (TC)	993	Unlu (G)
1005	Sukhbir	1073
Singaravadivel (K)	1083	Uzogara (SG)
993	Surowka (K)	1000
Singh (B)	1122	Vaghela (MN)
996 1043	Surve (AN)	1066
Singh (G)	1105	Vali (SA)
1045	Swanson (BG)	1168
Singh (RP)	998	Van Den Berg (H)
1149	Swaroop Dighe	1194
Singh (S)	1186	Van Dokkum (W)
980 1064 1083	Synowieeki (J)	1194
Singh (U)	1121	Van Gorsel (H)
996	Takagi (T)	1153
Singhal (RS)	1162	Van Loveren (H)
969 1103	Takahashi (T)	1194
Sinha (LK)	1014	Vanderlinde (PB)
1045	Takano (Y)	1098
Smith (DE)	1013	Varcin (P)
1092	Tarwate (BG)	1067 1090 1093
Smith (JL)	1095	Vatsala (CN)
976 982	Tasneem (R)	1047
Smith (JP)	1010	Venkateswara Rao (G)
1096	Taylor (KDA)	1046
Smith (L)	1135	Vergano (PJ)
1145	Taylor (MAJ)	1036
Smits (M)	1099	Verma (SS)
1153	Technology Information Forecast-	1118
Snyder (JM)	ing and Assessment	Vijayendra (SVN)
1011	955	1057
Sohal (S)	Tek Ram	Vos (JG)
1075	1020	1194
Sood (DR)	Testin (RF)	Wadhwa (BK)
999 1020	1036	1079
Spanhaak (S)	Thayer (DW)	Wakeling (IN)
1194	1120	1177
Sridhar (R)	Thiagu (R)	Waldroup (AL)
1008 1159	1027	1094
Sripathy (NV)	Thirumala Rao (SD)	Walker (RL)
1141	1171	1068
Srivastava (AK)	Thomas (P)	Wang (CR)
1042	1030	1112
St John Coghlan (D)	Toda (S)	Wang (Z)
1146	1013	1135 1175
Steele (JL)	Tompkin (RB)	Ward (JM)
1073	1102	1174
Stern (DJ)	Tong (AKW)	Watson (MP)
1026	1108	1178
Sternitzke (A)	Torres (JA)	
	1074	

Wauthoz (P)  
975  
Wel (CI)  
973  
Welsh (WD)  
1006  
Wenzel (JM)  
977  
Werkhoff (P)  
991  
White (CH)  
1053  
Wilson (J)  
1037  
Woodrow (J)  
1146

Wu (C-M)  
1031 1125  
Wu (Y)  
1025  
Yadav (TD)  
1184  
Yamamoto (Y)  
1014  
Yamazaki (S)  
1013  
Yan (X)  
1135 1175  
Yang (J)  
956  
Yayabe (F)  
1155

Yoon (YC)  
1064  
Yoshida (M)  
1012  
Yoshii (H)  
1014  
Zabik (MJ)  
966  
Zarkadas (CG)  
1113  
Zayas (JF)  
1111 1112  
Zehavi (U)  
1152  
Zollweg (JA)  
1160



# SUBJECT INDEX

- Abattoir**  
deonar abattoir, environment & microbial analysis in 1095
- Acacia**  
green gram seed infested *C. chinensis*, *Acacia* effect on 1185
- Acceptability**  
food acceptability disconfirmed consumer expectations effect on 1180  
yoghurts, consumer acceptability prediction of 1086  
yoghurts, consumer acceptance of whey protein concentrate based frozen 1087
- Acetic acid**  
beef, acetic acid preservative effect on stored 1105
- Achyranthus aspera**  
see *Apamarga*
- Acorus calamus**  
see Sweet flag
- Adulteration**  
meat, adulteration detection in 1103
- Aflatoxins**  
seed lipids & *Asp. parasiticus* aflatoxin production 979
- Agricultural products**  
moisture content & wt. change in agricultural products 1183
- Aldehydes**  
oils, aldehydes detn. in autoxidized fish/vegetable 1162
- Alkylpyrazines**  
bacteria for alkylpyrazines 984
- Amrapali**  
see Mangoes
- Antibrowning agents**  
989
- Antimicrobial activities**  
*Luffa tuberosa*, antimicrobial activity of 1032
- Antimicrobial agents**  
khoa, antimicrobial agents & microbial quality of 1081
- Antimutagenicity**  
sorghum, polyphenol-rich fractions antimutagenicity from 995
- Antioxidant properties**  
milk fats, prooxidative/antioxidative effects on 1061
- Antioxidants**  
carnosines, copper/iron & antioxidant mechanism of 1190
- Apamarga**  
*Achyranthus aspera* effect on green gram seed infested *C. chinensis* 1185
- Apricots**  
beverages, preparation/storage of ready-to-serve 1150
- Aralu**  
1040
- Aroma**  
Cheddar cheese, temp. & aroma development in 1074
- Aromatic compounds**  
bacteria for aromatic compounds 984
- Arsenic**  
seafoods, As residues in 1133
- Artichokes**  
hearts, texture & processing condition for canning low-acid artichoke 1029
- Ascorbates**  
sausages, ascorbate & colour of dry/fermented 1115
- Ascorbic acid**  
antibrowning agent 989
- Aseptic packaging**  
milk products, *Bacillus* & spoilage aseptically packed pasteurised 1069
- Aseptic processing**  
food particulates, ohmic heating & aseptic processing of 954
- Ash**  
faba bean var., ash in 1001
- Aspergillus parasiticus**  
seed lipids & *Asp. parasiticus* growth/aflatoxin production 979
- Avalakki**  
1040
- Azadirachta indica**  
see Neem
- Bacillus**  
milk products, *B. circulans/cereus* & spoilage aseptically packed pasteurised 1069
- Bacillus cereus**  
chicken meat, radiation *B. cereus* control in 1123  
lassi, *B. cereus* in 1082
- Bacillus subtilis**  
lassi, *B. subtilis* in 1082
- Bacteria**  
aerobic bacteria detn. in foods 974  
flavour metabolites, bacteria for 984
- Bajra**  
*Pennisetum americanum*, fibre content of Indian 992
- Bakeries**  
investment/resource use efficiency in bakery production 1039
- Bakery products**  
consumers expenditure/opinion on bakery products 1038  
milk/milk products for bakery products 1041
- Baking**  
bread, baking characteristics of soy-fortified 1045
- Bananas**  
temp. & chlorophyll/carotenoids of ripening Cavendish bananas 1030
- Barleys**  
hypocholesterolemic effect of barley diets 1188
- Beef**  
acetic acid & preservative effect on stored buffalo meat 1105  
bacteria-aerobic detn. in ground beef 974  
electrical stimulation/boning-temp./conditioning made & display colour of beef 1104
- Beer**  
foam, immunochemical analysis of beer 1145  
polypeptides & foaming potential in beer 1146  
yeast/immobilization technology & flavour development in beer 1144
- Beverages**  
ready-to-serve beverages, preparation/storage of 1150  
yeast/immobilization technology & flavour development in fermented beverages 1144
- Bhaji**  
1040
- Bifidobacteria**  
fermented milk, bifidobacteria therapeutic value in 1057
- Bioavailability**  
soy flour, heat & iron bioavailability in 1015
- Biocides**  
*Listeria monocytogenes* resistance to biocides 978

- Biological properties**  
mahua oils, biological properties of raw/used 1168
- Biotechnology**  
dairy industries & application of biotechnology 983  
dairy industries, biotechnological applications in 1052  
shelf-life extension & biotechnology 987
- Bisibele bath**  
1040
- Black gram**  
Vigna mungo, fibre content in Indian 992  
Vigna mungo, nutritional/cooking evaluation of 999
- Blanching**  
peas, blanching & quality of dehydrated 1003  
sweet potatoes, water blanching & darkening/phenol concn./PPO activity in frozen 1024
- Bleaching**  
oils, bleaching-hydrogen of soybean/cottonseed 1163
- Boning**  
beef, boning-temp. & display colour of 1104
- Boondi**  
1040
- Brassica campestris**  
see Rapeseeds
- Brassica juncea**  
see Mustards
- Bread**  
formulations, development of var. bread 1043  
milk products & quality of bread 1042  
soft bread from hard wheat 1044  
soy-fortified bread, baking/nutritional characteristics of 1045
- Brewing**  
sugars-brewing 1037
- Broccoli**  
vitamin C/ $\beta$ -carotenes in fresh/frozen broccoli 1025  
volatiles of low-oxygen atm. stored broccoli 1026
- Broilers**  
floor space & meat quality in commercial broilers 1124
- Browning**  
food systems, glass transition & nonenzymatic browning in 968  
milk, proteins & browning 1089  
sweet potatoes, water blanching & darkening in frozen 1024
- Byproducts**  
chicken byproducts incorporation in mutton nuggets 1106
- Cadmium**  
seafoods, Cd residues in 1133
- Cajanus cajan**  
see Redgram
- Calcium**  
milk products, dietary Ca in 1064  
myofibrillar proteins, calcium ions & solubilization of 1099
- Callosobruchus chinensis**  
green gram seed infested C. chinensis, plant materials effect on 1185  
phosphine/methyl bromide ovicidal efficacy against stored C. chinensis 1184
- Campylobacter jejuni**  
turkey rolls, Camp. jejuni survival in modified atm. packaged 1126
- Canned foods**  
daminozide decomposition in canned solutions 966
- Canning**  
artichoke hearts, texture & processing condition for canning low-acid 1029
- Canola oils**  
deodorizer distillate, enzymatic methylation of canola oils 1166  
glycerides-polymorphic behaviour of hydrogenated canola oils 1165
- Canola proteins**  
isolation methodology of canola proteins 1006
- Capelin**  
roe capelin, redfeed level/fish size/roe content in quality of 1138
- Caramel III**  
immune system, caramel colour III effect on 1194
- Carbohydrates**  
carrot genotypes, carbohydrates assays in 1020  
soy rabadi, carbohydrate profile of 1016  
soybean oligosaccharide syrup, carbohydrates identification/composition in 1013
- Carbon dioxide**  
fatty acids, carbon dioxide & viscosities of 1160  
foods, high pressure CO<sub>2</sub> & bacteria in 973  
offals, shelf-life of modified atm. packaged non-muscle 1097
- Carcass**  
lamb carcass composition, estimation electronic probe system of 1108
- Carminic acid**  
genotoxicity of carminic acid 1195
- Carnosines**  
copper/iron & antioxidant mechanism of carnosines 1190
- Carotenes**  
green beans/broccoli,  $\beta$ -carotenes in fresh/frozen 1025
- Carotenoids**  
bananas, temp. & carotenoids of ripening Cavendish 1030
- Carrots**  
Daucus carota genotypes, carbohydrates/pigment assays in 1020
- Casein**  
measurement microparticle-enhanced nephelometric immunoassay of casein 1093
- Cassava starch**  
yeasts & ethanol production from cassava starch hydrolysate 1021
- Casuarina**  
green gram seed infested C. chinensis, casuarina effect on 1185
- Catfish**  
diet/packaging/frozen storage & chemical changes/sensory evaluation of channel catfish 1140
- Cereals**  
fibre content of Indian cereals 992
- Chakli**  
1040
- Chapathi**  
1040
- Cheddar cheese**  
irradiation electron beam & mold decontamination in Cheddar cheese 1075  
temp. & aroma/flavour development in Cheddar cheese 1074
- Cheese**  
accelerated cheese ripening & biotechnology 983  
coagulants & cheese yield performance 1072  
domiati cheese with vegetables 1076  
lactic acid bacteria & flavour



- development in cheese 1073
- Chemical properties**
  - mahua oils, chemical properties of raw/used 1168
  - safflower seed proteins, ethanol washing & chemical properties of 1010
  - tomatoes, var. & chemical properties of 1028
- Chholay**
  - curried 1040
- Chick peas**
  - Cicer arietinum*, fibre content in Indian 992
- Chickens**
  - bacteria-aerobic detn. in ground chickens 974
  - breast muscles, ionizing radiation & tocopherols in fresh chicken 1120
  - gizzard pickles, processing of chicken 1118
  - heads, protein hydrolysate from chicken 1122
  - meat, aqueous washing & colour/nutrient quality of mechanically deboned chicken 1121
  - meat, radiation microbial decontamination of chicken 1123
  - mutton nuggets, chicken byproducts incorporation in 1106
  - rolls, binding substrate/additive/tenderisation effect on cured chickens 1119
- Chickpea**
  - tempeh, *Lact. plantarum* & *Staph. aureus* growth inhibition in fermenting chickpea based 1017
- Chikki**
  - 1040
- Chillies**
  - red chillies, toxicity of 1174
- Chitin**
  - Listeria monocytogenes* attachment to chitin 978
- Chitosan**
  - grains/vegetables, chitosan & storage proteins contents of 994
- Chivda**
  - 1040
- Chlorophyll**
  - bananas, temp. & chlorophyll of ripening Cavendish 1030
- Chloropropanols**
  - protein hydrolysates, chloropropanols formation from 1187
- Chymosin**
  - cheese yield performance & chymosin 1072
- Cicer arietinum***
  - see Chick peas
- Cider**
  - flavour profiling of cider 1178
- Citric acid**
  - antibrowning agent 989
- Clostridium botulinum***
  - pasta, water activity & Cl. botulinum toxin production in fresh 1048
- Coagulants**
  - cheese yield performance & milk coagulants 1072
- Cocktails**
  - fruit juice cocktails 1149
- Cocoa butter**
  - substitutes, lipase-catalyzed ester interchange & Indian vegetable fat modification into cocoa butter 1159
- Coconut oils**
  - dry processing technology & extraction of coconut oils 1167
- Collagens**
  - goat muscles, animal age/thermal stability & collagen from 1107
- Colour**
  - beef, electrical stimulation/boning-temp./conditioning mode & display colour of 1104
  - chicken meat, aqueous washing & colour of mechanically deboned 1121
  - ham, packaging & colour photodegradation of pasteurized sliced 1114
  - meat emulsions, fillers & colour of 1101
  - sausages, nitrate/nitrite/ascorbate & colour of dry/fermented 1115
- Colours**
  - food colours 990
- Comminuted meat products**
  - see Meat products
- Conditioning**
  - beef, conditioning mode & display colour of 1104
- Consumers**
  - bakery products, consumers expenditure/opinion on 1038
  - food acceptability, disconfirmed consumer expectation effect on 1180
  - yoghurts, consumer acceptability of prediction of 1086
- Contamination**
  - Cheddar cheese, irradiation electron beam & mold decontamination in 1075
  - milk, radioactive contaminants removal from 1050
- Convenience foods**
  - emerging scenario 1040
- Cooking**
  - black gram, cooking quality evaluation of 999
  - cowpeas, water hardness & cooking characteristics of 1000
- Copper**
  - carnosines, copper & antioxidant mechanism in 1190
- Corcyr a cephalonica***
  - phosphine/methyl bromide ovicidal efficacy against stored Cor. cephalonica 1184
- Corn**
  - Zea mays*, fibre content of Indian 992
- Corn flour**
  - meat products, corn germ protein flour in comminuted 1111
- Corn germ**
  - meat products, corn germ protein flour in comminuted 1111
  - meat products, corn germ use in comminuted 1112
- Corn proteins**
  - chitosan & storage protein contents of corn 994
- Cottonseed oils**
  - bleaching-hydrogen of cottonseed oils 1163
- Cowdung**
  - green gram seed infested *C. chinensis*, cowdung effect on 1185
- Cowpeas**
  - seed lipids & *Asp. parasiticus* growth/aflatoxin production 979
  - water hardness & cooking characteristics of cowpeas 1000
- Crinum defixum***
  - see Kesarachettu
- Curdlan**
  - properties/application of curdlan 962
- Cutlets**
  - 1040
- Cypermethrin**
  - mangoes, washing/peeling & fenvalerate residue decontamination on 1033
- DDT**
  - seafoods, DDT residues in 1133
- Dahi**
  - bacterial therapeutic value in dahi 1057
  - dairy industry, dahi production in 1078

- Dairies**  
 bacteria in dairy plant environments 1053  
 biotechnological applications in dairy industries 1052  
 biotechnology, dairy industries & application of 983  
 dahi production in dairy industries 1078  
 Punjab, dairying potential in 1051  
 quality assessment  
 instrumentation in dairy industries 1049
- Dairy products**  
 microparticle-enhanced nephelometric immunoassay of dairy products 1067
- Dalia**  
 1040
- Daminozide**  
 canned solutions, daminozide decomposition in 966
- Daucus carota**  
 see Carrots
- Decontamination**  
 mangoes, washing, peeling & insecticide residue  
 decontamination on 1033
- Dehydrated foods**  
 peas, pricking/blanching/drying  
 air temp. & quality of  
 dehydrated 1003
- Desideratum**  
 flavour control, desideratum for 1147
- Dieldrin**  
 seafoods, dieldrin residues in 1133
- Diets**  
 iodine content in Bombay population diets 1186  
 vegetarian diet & food industries 1191
- Dihydro-1,3,5-dithiazines**  
 organoleptic properties of dihydro-1,3,5-dithiazines 991
- Dimethoate**  
 mangoes, washing/peeling & dimethoate residue  
 decontamination on 1033
- Distribution**  
 milk distribution in India 1062
- Dosai**  
 1040
- Dough**  
 rheological characteristics detn method of dough, review 1046
- Dried foods**  
 mackerels, preservatives/salt  
 sterilization of salted dried 1141
- Drop volume**  
 contact angle, drop volume effect on 956
- Drying**  
 blanching & quality of dehydrated 1003  
 peas, drying air temp. & quality of dehydrated 1003
- Duck**  
 meat, volatile components of  
 water-boiled duck 1125
- EDTA**  
 antibrowning agent 989
- ELISA**  
 Listeria detection ELISA in meat 1098
- Egg yolks**  
 powders, Listeria monocytogenes survival in egg yolk 1129
- Eggs**  
 Listeria monocytogenes survival in whole eggs 1129  
 hens, egg quality factors in white leghorn 1127  
 infected hens & Salmonella enteritidis in fresh/stored eggs 1130  
 liquid whole eggs, Listeria monocytogenes survival in 1129  
 nutritive value of eggs 1128
- Electrical stimulation**  
 beef, electrical stimulation & display colour of 1104  
 rabbit skeletal muscle, electrical stimulation & rheological properties of 1110
- Emulsifying properties**  
 lysozyme-galactomannan conjugate, emulsifying/bactericidal properties of bifunctional 1189
- Emulsions**  
 food emulsions,  $a_w$ /chemical composition of 961  
 meat emulsions, fillers & hydration properties of 1100  
 meat emulsions, fillers & pH/colour of 1101
- Enterobacter**  
 chicken meat, radiation  
 enterobacter control in 1123
- Environment**  
 abattoir, environment & microbial analysis in deonar 1095
- Enzymes**  
 biotechnology & dairy enzymes 983  
 food quality, enzymes as indices of 969  
 fungi, enzymes from filamentous 986
- whey proteins, proteolytic enzymes & hydrolysis of 1085
- Ephestia cautella**  
 phosphine/methyl bromide ovicidal efficacy against stored E cautella 1184
- Essential oils**  
 Mammea longifolia flower buds, essential oil composition of 1171  
 marjoram, essential oil composition of 1176
- Esterification**  
 fatty acids, esterification of polyunsaturated 1161
- Ethyl alcohol**  
 safflower seed proteins, ethanol washing & properties of 1010  
 Zymomonas mobilis & cassava starch hydrolysate for ethanol production 1021
- Expanded cereals**  
 1040
- Extraction**  
 coconut oils, dry processing technology & extraction of 1167
- Faba beans**  
 Vicia faba var., proximate composition/protein fractions of 1001
- Fats**  
 dietary fat & heart disease 1192  
 faba bean var., fats in 1001  
 faba bean var., protein fractions of 1001  
 potatoes, process variables  
 optimization of deep-fat-frying 1023  
 vegetable cocoa butter  
 substitutes, lipase-catalyzed ester interchange & Indian vegetable fat modification into 1159
- Fats Milk**  
 phospholipids  
 oxidative/antioxidative effects on milk fats 1061
- Fatty acids**  
 carbon dioxide & viscosities of fatty acids 1160  
 esterification of polyunsaturated fatty acids 1161
- Fenthion**  
 mangoes, washing/peeling & fenthion residue decontamination on 1033
- Fenvalerate**  
 mangoes, washing/peeling & fenvalerate residue  
 decontamination on 1033



## **Fermentation**

- tempeh fermentation, solid state quinoa 971
- tempeh, *Lact. plantarum* & *L. monocytogenes* growth inhibition in fermenting 997

## **Fermented foods**

- beverages, yeast/immobilization technology & flavour development in fermented 1144
- microbial quality of Southeast Asian traditional fermented foods 970
- sausages, nitrate/nitrite/ascorbate & colour of dry/fermented 1115

## **Fibres**

- bread formulations, development of high fibre based 1043
- fababean var., crude fibre in 1001
- grains, fibre content of Indian food 992

## **Fillers**

- meat emulsions, fillers & hydration properties of 1100
- meat emulsions, fillers & pH/colour of 1101

## **Finfish**

- minerals/composition of Arabian finfish 1137

## **Fish**

- muscle, threonine aldolase in fish 1139

## **Fish oils**

- aldehydes detn. in autoxidized fish oils 1162

## **Flavour**

- beverages, yeast/immobilization technology & flavour development in fermented 1144
- Cheddar cheese, temp. & flavour development in 1074
- cheese, lactic acid bacteria & flavour development in 1073
- cider, flavour profiling of 1178
- desideratum for flavour control 1147
- soybean oils, flavour reversion of 1170
- teas, flavour quality GC analysis in Kenyan black 1157
- yeasts, flavour/flavour enhancers from 985

## **Flavour compounds**

- bacteria for flavour metabolites 984
- dihydro-1,3,5-dithiazines, organoleptic properties of 991
- fungi, flavour metabolites/enzymes from

- filamentous 986
- yoghurts, volatile flavour compounds of 1088

## **Foam**

- beer foam, immunochemical analysis of 1145
- beer, polypeptides & foaming potential in 1146

## **Food policy**

- food processing industries & industrial policy 950

## **Foodborne**

- toxoplasmosis-foodborne 982

## **Fried foods**

- nutritional value deep fat frying effect on fried foods 967

## **Frozen foods**

- green beans/broccoli, vitamin C/ $\beta$ -carotenes in fresh/frozen 1025
- milk product plants, *Listeria* in Californian frozen 1068
- sweet potatoes, water blanching & darkening/phenol concn./PPO activity in frozen 1024
- yoghurts, composition/consumer acceptance of whey protein concentrate based frozen 1087

## **Fruits**

- juice cocktails from tropical fruits 1149

## **Frying**

- fried foods, nutritional value deep-fat-frying effect on 967
- potatoes, process variables optimization of deep-fat-frying 1023

## **Fungi**

- flavour metabolites/enzymes from filamentous fungi 986

## **Gajjak**

- 1040

## **Garlic oils**

- health products, garlic oil content in garlic oil based 1175

## **Gas chromatography**

- teas, flavour quality GC analysis in Kenyan Black 1157

## **Genotoxicity**

- carminic acid, genotoxicity of 1195

## **Ghee**

- residues, lactones estimation spectrophotometric method in ghee 1079

## **Gizzard**

- chicken gizzard pickles, processing of 1118

## **Glucosinolates**

- Brassica* var., glucosinolate

- content of 1005

## **Glycerides**

- canola oils, glycerides polymorphic behaviour of hydrogenated 1165

## **Goat**

- muscles, animal age/thermal stability & collagen from goat 1107

## **Green beans**

- vitamin C/ $\beta$ -carotenes in fresh/frozen green beans 1025

## **Green gram**

- seed lipids & *Asp. parasiticus* growth/aflatoxin production 979
- Vigna radiata*, fibre content in Indian 992

## **Groundnut proteins**

- groundnut cvs, protein quality of 1008

## **Groundnuts**

- cvs, chemical composition/protein quality of groundnut 1008
- seed lipids & *Asp. parasiticus* growth/aflatoxin production 979
- seeds, soluble sugar composition of groundnut 1007

## **Guava**

- Psidium guajava* fruits, composition of 1031

## **Gum**

- rheological properties of gum/milk protein interactions 1092

## **Halwa**

- 1040

## **Ham**

- sliced ham, packaging & colour photodegradation of pasteurized 1114

## **Hanshi**

- Perilla frutescens*, chemical/nutritional value of 1009

## **Health**

- egg & health 1128
- lactose in human health 1056

## **Heart**

- dietary fat & heart disease 1192

## **Heat**

- protein deamidation, peptidoglutaminases & heat effect on 963
- soy flour, heat & iron bioavailability in 1015

## **Heating**

- food particulates, ohmic heating & aseptic processing of 954
- food, ohmic heating & sterilization of 957

- microwave heating, quality optimization in 959
- Heptachlor**  
seafoods, heptachlor residues in 1133
- Horsebean**  
tempeh, *Lact. plantarum* & *Staph. aureus* growth inhibition in fermenting soybean based 1017
- Hydration**  
meat emulsions, fillers & hydration properties of 1100
- Hydrochloric acid**  
antibrowning agent 989
- Hydrocolloids**  
milk systems, hydrocolloids role in stabilizing 1063
- Hydrogen**  
oils, bleaching-hydrogen of soybean/cottonseed 1163
- Hydrolysis**  
food simulants, hydrolysis of bisphenyl F diglycidyl ether in water-based 964  
tryptophan, barytic hydrolysis & detn. of 965  
whey proteins, proteolytic enzymes & hydrolysis of 1085
- Hypocholesterolemic effect**  
barley diets, hypocholesterolemic effect of 1188
- Ice cream**  
soft scoop ice cream, review 1080
- Idli**  
1040
- Imarti**  
1040
- Immobilization**  
beverages, immobilization technology & flavour development in fermented 1144
- Immunoassays**  
casein, measurement microparticle-enhanced nephelometric immunoassay of 1093  
milk/dairy products, microparticle-enhanced nephelometric immunoassays of 1067
- Industries**  
food industries, magnetic resonance imaging application in 960  
food industries, microwave processing in 958  
vegetarian diet & food industry 1191
- Insecticides**  
mangoes, washing/peeling & insecticide decontamination on 1033
- Iodine**  
diets, iodine content in Bombay population 1186
- Iron**  
carnosines, iron & antioxidant mechanism in 1190  
soy flour, heat & iron bioavailability in 1015
- Irradiation**  
Cheddar cheese, irradiation electron beam & mold decontamination in 1075
- Jeblei**  
1040
- Jhangiri**  
1040
- Kachori**  
1040
- Karchikai**  
see *Luffa tuberosa*
- Kesarachettu**  
*Crinum defixum* effect on green gram seed infested *C. chinensis* 1185
- Kheel**  
1040
- Khichdi**  
1040
- Khoa**  
antimicrobial agents/packaging materials & microbial quality of khoa 1081
- Khoj**  
1040
- Kidney beans**  
*Phaseolus vulgaris*, fibre content in Indian 992
- Kinnow-mandarin orange juices**  
thermal process/shelf-life evaluation of Kinnow-mandarin orange juices 1151
- Kisra**  
sorghum-based kisra, sensory/nutritional qualities of groundnut flour supplemented 996
- Kodbale**  
1040
- Lactalbumin**  
proteolytic enzymes & hydrolysis of lactalbumin 1085
- Lactic acid**  
beef, lactic acid preservative effect on stored 1105
- Lactic acid bacteria**  
cheese, lactic acid bacteria & flavour development in 1073  
identification procedure for lactic acid bacteria 975  
*Listeria monocytogenes*, lactic acid bacteria & behaviour of 977
- Lactalbumin**  
measurement microparticle-enhanced nephelometric immunoassay of  $\alpha$ -lactalbumin 1090
- Lactobacillus**  
soy lactic acid bacteria for Shiro-shoyu making 1014
- Lactobacillus acidophilus**  
fermented milk, *L. acidophilus* therapeutic value in fermented 1057
- Lactobacillus helveticus**  
Mozzarella cheese, *Lact. helveticus* culture & physical properties of 1077
- Lactobacillus plantarum**  
tempeh, *Lact. plantarum* & *Listeria monocytogenes* growth inhibition in fermenting 997  
tempeh, *Lact. plantarum* & *Staph. aureus* growth inhibition in fermenting 1017
- Lactococcus**  
skim milk based products, *Lactococcus* during fermentation of 1060
- Lactoglobulin**  
measurement microparticle-enhanced nephelometric immunoassay of  $\beta$ -lactoglobulin 1090  
proteolytic enzymes & hydrolysis of lactoglobulin 1085
- Lactones**  
ghee residues, lactones estimation spectrophotometric method in 1079  
soybean 11S proteins, glucono- $\delta$ -lactone & viscoelasticity of 1012
- Lactose**  
health, lactose in human 1056  
milk/milk products, lactose detn. oxidation-reduction reaction in 1058
- Laddu**  
1040
- Lambs**  
carcass composition, estimation - electronic probe system of lamb 1108
- Lantana**  
*Lantana camara* effect on green gram seed infested *C. chinensis* 1185
- Lantana camara**  
see *Lantana*



- Lassi**  
aerobic spore formers in lassi 1082  
bacterial therapeutic value in lassi 1057
- Lead**  
seafoods, Pb residues in 1133
- Lectins**  
*Phaseolus vulgaris*, lectin thermal stability of black turtle soup bean 998
- Legumes**  
fibre content of Indian legumes 992
- Lens esculentum**  
see Lentils
- Lentils**  
*Lens esculentum*, fibre content in Indian 992
- Limonin**  
tangerine juices, maturity/processing & limonin in Thai 1154
- Lipids**  
autoxidation, bovine superoxide dismutase & inhibition of lipid 1158  
*Brassica* var., lipid composition of 1005  
fish, lipids in Arabian 1137  
pork muscles, fibres & lipid composition of 1109
- Listeria**  
foods, high pressure CO<sub>2</sub> & *Listeria* in 973  
meat, *Listeria* detection ELISA in 1098  
milk product plants, *Listeria* in Californian frozen 1068  
seafoods, *Listeria* detection in naturally contaminated 1132  
seafoods, *Listeria* incidence in 1136
- Listeria monocytogenes**  
biocides, *L. monocytogenes* resistance to 978  
chitin, *L. monocytogenes* attachment to 978  
dairy plant environments, *L. monocytogenes* in 1053  
eggs, *L. monocytogenes* survival in 1129  
growth temp. & injury/death of *L. monocytogenes* 976  
lactic acid bacteria & behaviour of *L. monocytogenes* 977  
processed meat, *L. monocytogenes* control in 1102  
skim milk based products, *L. monocytogenes*/Lactococci during fermentation of 1060  
tempeh, *Lact. plantarum* & *L. monocytogenes* growth inhibition in fermenting 997
- Lobsters**  
*Nephrops norvegicus*, phenolase activation process & protease activities in Norwegian 1135
- Luffa tuberosa**  
karchikai, antimicrobial activity of *L. tuberosa* 1032
- Lysozyme-galactomannan**  
conjugate, emulsifying/bactericidal properties of bifunctional lysozyme-galactomannan 1189
- Mackerels**  
preservatives/salt sterilization & microbial quality of salted-dried mackerels 1141
- Madhuca latifolia**  
see Mahua
- Magnetic resonance imaging**  
food industries, magnetic resonance imaging applications in 960
- Mahua oils**  
*Madhuca latifolia* oils, properties of raw/used 1168
- Malic acid**  
antibrowning agent 989
- Malonic acid**  
antibrowning agent 989
- Mammea longifolia**  
nagakesar flower buds, essential oil composition of 1171
- Mangoes**  
Amrapali/Totapuri mango pulps, nectar composition/quality from blended 1034  
washing/peeling & insecticide residue decontamination on mangoes 1033
- Marjoram**  
*Origanum majorana*, essential oil composition of 1176
- Meat**  
adulteration detection in meat 1103  
broilers, floor space & meat quality in commercial 1124  
*Listeria* detection ELISA in meat 1098  
processed meat, *Listeria monocytogenes* control in 1102  
safety & meat 1094  
shelf-life extension/microbial safety of fresh meat 1096
- Meat emulsions**  
fillers & hydration properties of meat emulsion 1100
- Meat products**  
comminuted meat products, corn germ/soy proteins use in 1112  
comminuted meat products, milk proteins/corn germ protein flour in 1111  
protein quality of meat products 1113
- Mercury**  
seafoods, Hg residues in 1133
- Metaphosphates**  
antibrowning agents 989
- Methyl bromide**  
insect pests, methyl bromide ovicidal efficacy against stored product 1184
- Methylation**  
canola oil deodorizer distillate, enzymatic methylation of 1166
- Microbial quality**  
fermented foods, microbial quality of Southeast Asian traditional 970  
khao, antimicrobial agents/packaging materials & microbial quality of 1081  
mackerels, preservatives/salt sterilization & microbial quality of salted dried 1141  
soy rabadi, microbial quality of 1016  
tofu, microbial quality of 1019
- Microorganisms**  
abattoir, environment & microbial analysis in deonar 1095  
chicken meat, radiation microbial decontamination of 1123  
meat, microbial safety of fresh 1096  
viable cell count analysis method for foods 972
- Microwaves**  
food industries, microwave processing in 958  
food products, microwaves & pasteurization/sterilization of 953  
heating, quality optimization in microwave 959  
soybeans, volatiles from microwave-treated stored 1011  
sterilization by microwaves 952
- Milk**  
bacteria-aerobic detn. in milk 974  
bakery products, milk for 1041  
coagulation, plasmin activity in milk 1059  
cultured milk products, milk LP system preserved use in 1065

fermented milk, bacteria  
therapeutic value in 1057  
hydrocolloids role in stabilizing  
milk systems 1063  
lactose detn. oxidation-reduction  
reaction in milk 1058  
microparticle-enhanced  
nephelometric immunoassay of  
milk 1067  
packaging/distribution of milk,  
India 1062  
proteins & browning in milk 1089  
radioactive contaminants removed  
from milk 1050  
ultrafiltered milk, urokinase &  
plasmin activation in 1071

#### **Milk powder**

bread, milk powder & quality of  
1042  
delactosed milk protein powder,  
properties of 1091

#### **Milk products**

acidophilus milk products,  
manufacture/therapeutic value of  
1070  
Bacillus & spoilage aseptically  
packed pasteurised liquid dairy  
products 1069  
bakery products, milk products  
from 1041  
bread, milk products & quality of  
1042  
Ca-dietary in milk products 1064  
cultured milk products, milk LP  
system preserved use in 1065  
lactose detn. oxidation-reduction  
reaction in milk products 1058  
Listeria in Californian frozen  
milk product plants 1068  
nutritional/therapeutic values of  
indigenous/western fermented  
milk products, review 1066

#### **Minerals**

fish, minerals of Arabian 1137

#### **Moisture**

agricultural products, moisture  
content & wt. change in stored  
1183  
paddy, parboiling low-moisture of  
993

#### **Mold**

Cheddar cheese, irradiation  
electron beam & mold  
decontamination in 1075

#### **Mozzarella cheese**

Lactobacillus helveticus culture  
& physical properties of  
Mozzarella cheese 1077

#### **Muchorai**

1040

#### **Mungbeans**

Vigna radiata noodles, quality  
detn. focus group technique of  
1002

#### **Murmura**

1040

#### **Murukku**

1040

#### **Muscles**

pork muscles, fibres & lipid  
composition of 1109

#### **Mustards**

Brassica juncea var.,  
glucosinolate/lipid composition  
of Indian 1005

#### **Mutton**

nuggets, chicken byproducts  
incorporation in mutton 1106

#### **Nagakesar**

see Mammea longifolia

#### **Namkeen**

1040

#### **Nan**

preparation lab. method of nan  
1047

#### **Naringin**

tangerine juices,  
maturity/processing & naringin  
in Thai 1154

#### **Nectar**

apricot nectar,  
preparation/storage of  
ready-to-serve 1150  
mango pulps, nectar  
composition/quality from blended  
Amrapali/Totapuri 1034

#### **Neem**

green gram seed infested C.  
chinensis, Azadirachta indica  
effect on 1185

#### **Nelpuri**

1040

#### **Nephrops norvegicus**

see Lobsters

#### **Nitrates**

sausages, nitrates & colour of  
dry fermented 1115

#### **Nitrites**

sausages, nitrites & colour of  
dry/fermented 1115

#### **Nucleoproteins**

yeast nucleoproteins 980

#### **Nuggets**

see Mutton

#### **Nutrients**

chicken meat, aqueous washing &  
nutrient quality of mechanically  
deboned 1121

#### **Nutrition**

Ca-dietary in human nutrition 1064

egg & nutrition 1128

#### **Nutritional quality**

blackgram, nutritional quality  
evaluation of 999  
bread, nutritional  
characteristics of 1045  
fried foods, nutritional deep fat  
frying effect on 967  
hanshi, nutritional value of 1009  
Kisra, nutritional qualities of  
groundnut flour supplemented  
sorghum-based 996  
milk products, nutritional values  
of indigenous/western fermented,  
review 1066  
rice bran oils, purification &  
nutritional values of 1169  
Spirulina, nutritional values of  
988

#### **Offals**

shelf-life of modified atm.  
packaged non-muscle offals 1097

#### **Oils**

aldehydes detn. in autoxidized  
oils 1162

#### **Oligosaccharides**

soybean oligosaccharide syrup,  
carbohydrates  
identification/composition in  
1013

#### **Olive oils**

phenolic compounds/stability of  
Virgin olive oils 1172

#### **Oolong tea**

see Tea

#### **Orange juices**

4-vinylguaiacol formation in  
orange juices 1152

#### **Origanum majorana**

see Marjoram

#### **Oryza sativa**

see Rice

#### **Oysters**

Listeria incidence in oysters 1136

#### **Packaging**

catfish, packaging method &  
chemical changes/sensory  
evaluation of channel 1140  
ham, packaging & colour  
photodegradation of pasteurized  
sliced 1114  
milk packaging in India 1062

#### **Packaging materials**

industry in India 955  
khoa, packaging materials &  
microbial quality of 1081

#### **Packaging modified atmosphere**

offals, shelf-life of modified  
atm. packaged non-muscle 1097  
turkey rolls, Camp. jejuni



- survival in modified atm.  
packaged 1126
- Paddy**  
parboiling-low-moisture of paddy 993
- Pakora**  
1040
- Papads**  
1040
- Paper**  
peaches, paper packaging materials & vibration bruising of 1036
- Parboiling**  
paddy, parboiling low-moisture of 993
- Parotha**  
1040
- Pasta**  
water activity & *Cl. botulinum* toxin production in fresh pasta 1048
- Pasteurization**  
microwaves & pasteurization of food products 953  
seafoods, pasteurization of 1134
- Peaches**  
paper/plastic packaging materials & vibration bruising of peaches 1036  
puree, yr/cv/fruit maturity & quality of peach 1035
- Peas**  
*Pisum sativum*, fibre content in dried 992  
*Pisum sativum*,  
pricking/blanching/drying air temp. & quality of dehydrated 1003  
tempeh, *Lact. plantarum* & *Staph. aureus* growth inhibition in fermenting pea based 1017
- Pecan**  
bacteria-aerobic detn. in shelled pecan 974
- Pectins**  
guava fruits, pectins in 1031
- Peeling**  
mangoes, peeling & insecticide residue decontamination on 1033
- Pennisetum americanum***  
see Bajra
- Peptides**  
biochemical interactions of food-desired peptides 1193
- Peptidoglutaminases**  
protein deamidation, peptidoglutaminase & heat/proteolysis effect on 963
- Perilla frutescens***  
see Hanshi
- Pesticides**  
seafoods, pesticide residues in 1133
- Phaseolus vulgaris***  
see Kidney beans
- Phenolases**  
lobster, phenolase activation process & protease activities in Norwegian 1135
- Phenolic compounds**  
olive oils, phenolic compounds of virgin 1172
- Phenols**  
sweet potatoes, water blanching & phenol concn. in frozen 1024
- Phosphine acid**  
antibrowning agent 989
- Phosphines**  
insect pests, phosphine ovicidal efficacy against stored product 1184
- Phospholipids**  
milk fats, phospholipids oxidative/antioxidative effects on 1061
- Phosphorus**  
fish, P in Arabian 1137
- Physical properties**  
Mahua oils, physical properties of raw/used 1168  
milk protein powder, physical properties of delactosed 1091  
Mozzarella cheese, *Lact. helveticus* culture & physical properties of 1077  
safflower seed proteins, ethanol washing & physical properties of 1010  
tomatoes, var. & physical properties of 1028
- Pickles**  
chicken gizzard pickles, processing of 1118  
fermented pickles liquid part as seasoning agents 1173
- Pigments**  
carrot genotypes, pigments assays in 1020  
tomatoes, pigments content measurement light reflectance in 1027
- Pisum sativum***  
see Peas
- Plasmin**  
milk coagulation, plasmin activity in 1059  
milk, urokinase & plasmin activation in ultrafiltered 1071
- Plastics**  
peaches, plastic packaging materials & vibration bruising of 1036
- Poha**  
1040
- Polyphenol oxidases**  
teas, fermentation & polyphenoloxidase activity in orthodox/CTC 1156
- Polyphenoloxidases**  
antibrowning agents 989  
sweet potatoes, water blanching & polyphenoloxidases activity in frozen 1024
- Polyphenols**  
sorghum, polyphenol-rich fractions antimutagenicity from 995
- Polyphosphates**  
antibrowning agent 989
- Pomegranates**  
wine from pomegranates 1148
- Poori**  
1040
- Pork**  
bacteria-aerobic detn. in ground pork 974  
muscles, fibres & lipid composition of pork 1109
- Potatoes**  
process variables optimization of deep-fat-frying potatoes 1023
- Pouches**  
Kinnow-mandarin orange juices, shelf-life evaluation of flexible pouch stored 1151
- Poultry**  
developments in poultry 1117  
production/development-poultry in Bangladesh, review 1116  
safety & poultry meat 1094
- Preservatives**  
fermented pickles liquid part as preservatives 1173
- Processing**  
chicken gizzard pickles, processing of 1118  
food processing, hydrolysed lactose whey in 1083  
image processing techniques for food 951  
tangerine juices, maturity/processing & bitter compounds in Thai 1154
- Propionic acid**  
beef, propionic acid preservative effect on stored 1105
- Proteases**  
lobster, phenolase activation process & protease activities in

Norwegian 1135

**Proteinases**  
Cajanus cajan, proteinase inhibitors of 1004

**Proteins**  
deamidation, peptidoglutaminase & heat/proteolysis effect on protein 963  
faba bean var., protein fractions of 1001  
hydrolysates, chloropropanols formation from protein 1187

**Proteins animal**  
calcium ions & solubilization of myofibrillar proteins 1099  
chicken heads, protein hydrolysate from 1122

**Proteins fish**  
fish, proteins in Arabian 1137

**Proteins meat**  
meat products, protein quality of 1113

**Proteins milk**  
gum/milk proteins interactions, rheological properties of 1092  
meat products, milk proteins in comminuted 1111  
milk, proteins & browning in 1089

**Proteolysis**  
protein deamidation, peptidoglutaminase & proteolysis effect on 963

**Prune juices**  
compositional characterization of prune juices 1153

**Pungency**  
oral pungency, descriptive analysis of 1181

**Purees**  
peach puree, yr/cv/fruit maturity & quality of 1035

**Quality**  
bread, milk products & quality of 1042  
broilers, floor space & meat quality in commercial 1124  
dairy industries, quality assessment instrumentation in 1049  
egg quality factors in white leghorn hens 1127  
food quality, enzymes as indices of 969  
mango pulps, nectar quality from blended Amrapali/Totapuri 1034  
mungbean noodles, quality detn. focus group technique of 1002  
peach puree, yr/cv/fruit maturity & quality of 1035  
peas, pricking/blanching/drying

air temp. & quality of dehydrated 1003  
roe capelin, redfeed level/fish size/roe content & quality of 1138  
teas, flavour quality GC analysis in Kenyan black 1157

**Quinoa**  
tempeh fermentation, solid state quinoa 971

**Rabadi**  
soy rabadi, microbial quality/carbohydrate profile of 1016

**Rabbit**  
skeletal muscle, electrical stimulation & rheological properties of rabbit 1110

**Radiation**  
chicken breast muscles, ionizing radiation & tocopherols in fresh 1120  
chicken meat, radiation microbial decontamination of 1123

**Radioactivity**  
milk, radioactive contaminants removal from 1050

**Rapeseeds**  
Brassica campestris var. glucosinolate/lipid composition of Indian 1005

**Rasam**  
1040

**Redgram**  
Cajanus cajan, proteinase inhibitors of 1004

**Residues**  
seafoods, residues in 1133

**Rheological properties**  
dough, rheological characteristics detn. method of, review 1046  
gum/milk protein interactions, rheological properties of 1092  
rabbit skeletal muscle, electrical stimulation & rheological properties of 1110

**Rice**  
Oryza sativa, fibre content of Indian 992

**Rice bran oils**  
purification & nutritional value of rice bran oils 1169

**Ripening**  
bananas, temp. & chlorophyll/carotenoids of ripening Cavendish 1030

**Roasted foods**  
duck meat, volatile components of Cantonese style roasted 1125

**Safety**  
food colours 990  
meat, microbial safety of fresh 1096

**Safflower seed proteins**  
ethanol washing & properties of safflower seed proteins 1010

**Saithe**  
kidney, trimethylamine N-oxid demethylase of saithe 1142

**Salmonella**  
chicken meat, radiation Salmonella control in 1123  
dairy plant environments, Salmonella in 1053  
foods, high pressure CO<sub>2</sub> & Salmonella in 973

**Salmonella enteritidis**  
eggs, infected hens & S. enteritidis in fresh/stored 1130

**Salted foods**  
mackerels, preservatives/salt sterilization of salted-dried 1141

**Sambhar**  
1040

**Samosa**  
1040

**Sausages**  
fermented sausages, nitrate/nitrite ascorbate & colour of dry 1115

**Seafoods**  
Listeria detection in naturally contaminated seafoods 1132  
pasteurization/shelf-life extension of seafoods 1134  
residues in seafoods 1133  
sensory factors in processed seafoods 1131

**Selenium**  
seafoods, Se residues in 1133

**Sensory evaluation**  
catfish, diet/packaging/frozen storage & sensory evaluation of channel 1140  
consensus test for procrustes analysis 1177  
time-intensity & category scales in sensory evaluation 1179

**Sensory properties**  
seafoods, sensory factors in processed 1131

**Sensory quality**  
Kisra, sensory qualities of groundnut flour supplemented sorghum-based 996

**Shakarparas**  
1040



- Shelf-life**  
 biotechnology & shelf-life extension 987  
 Kinnow-mandarin orange juices, shelf-life evaluation of 1151  
 meat, shelf-life extension of fresh 1096  
 offals, shelf-life of modified atm. packaged non-muscle 1097  
 seafoods, shelf-life extension of 1134
- Shellfish**  
 minerals/composition of Arabian shellfish 1137
- Shiro-shoyu**  
 soy lactic acid bacteria for shiro-shoyu making 1014
- Shrimps**  
 Listeria incidence in shrimps 1136
- Simulants**  
 hydrolysis of bisphenol F diglycidyl ether in water-based food simulants 964
- Sitophilus oryzae**  
 phosphine/methyl bromide ovicidal efficacy against stored Sit. oryzae 1184
- Skim milk**  
 products, L.  
 monocytogenes/Lactococci during fermentation of skim milk based products, L.  
 monocytogenes/Lactococcus during fermentation of 1060
- Smoke condensate**  
 phenolic smoke condensate effect on hepatic system 1196
- Sodium**  
 low-Na bread formulations, development of 1043  
 shellfish, Na in 1137
- Sodium acid phosphates**  
 antibrowning agent 989
- Sodium benzoate**  
 mackerels, sodium benzoate & microbial quality of salted-dried 1141
- Sodium caseinates**  
 chicken rolls, sodium caseinate effect on cured 1119
- Sorghum**  
 seed lipids & growth/Asp parasitic growth/aflatoxin production 979  
 sorghum bicolor, polyphenol-rich fractions antimutagenicity from 995
- Sorghum flour**  
 Kisra, sensory/nutritional qualities of groundnut flour supplemented sorghum-based 996
- Soup beans**  
 Phaseolus vulgaris, lectin thermal stability of black turtle soup bean 998
- Soy flour**  
 heat & iron bioavailability in soy flour 1015
- Soy paneer**  
 see Tofu
- Soy products**  
 rabadi, microbial quality/carbohydrate profile of soy 1016  
 soybean oligosaccharide syrup, carbohydrates identification/composition in 1013
- Soy proteins**  
 chicken rolls, soy isolate effect on cured 1119  
 glucono- $\delta$ -lactone & viscoelasticity of soybean 11S proteins 1012  
 meat products, soy proteins use in 1112
- Soybean oils**  
 bleaching-hydrogen of soybean oils 1163  
 flavour reversion of soybean oils 1170  
 temp. & induction time of stabilized oils 1164
- Soybeans**  
 bread, baking/nutritional characteristics of soy-fortified 1045  
 shiro-shoyu making, soy lactic acid bacteria for 1014  
 volatiles from microwave-treated stored soybeans 1011
- Spectrophotometry**  
 ghee residues, lactones estimation spectrophotometric method in 1079
- Spirulina**  
 nutritional value of Spirulina 988
- Spoilage**  
 milk products, Bacillus & spoilage aseptically packed pasteurised 1069
- Squash**  
 apricot squash, preparation/storage of ready-to-serve 1150
- Stability**  
 olive oils, stability of virgin 1172
- Staphylococcus**  
 chicken meat, radiation Staphylococcus control in 1123
- Staphylococcus aureus**  
 temphe, Lact. plantarum & Staph. aureus growth inhibition in fermenting 1017
- Sterilization**  
 food products, microwaves & sterilization of 953  
 microwave sterilization 952  
 ohmic heating & sterilization of food 957
- Storage**  
 apricot beverages, storage of ready-to-serve 1150  
 eggs, infected hens & Salmonella enteritidis in fresh/stored 1130  
 Kinnow-mandarin orange juices, shelf-life evaluation of stored 1151  
 tofu, textural changes in pasteurised stored 1018
- Storage cold**  
 beef, preservative effect on stored 1105
- Storage controlled atmospheres**  
 broccoli, volatiles of low-oxygen atm. stored 1026
- Storage frozen**  
 catfish, frozen storage & chemical changes/sensory evaluation of channel 1140
- Storage vegetables**  
 soybeans, volatiles from microwave-treated stored 1011
- Sugars**  
 brewing sugars 1037  
 groundnut seeds, soluble sugar composition of 1007  
 guava fruits, sugars in 1031
- Sunflowers**  
 bread formulations, development of sunflower kernel based 1043
- Superoxide dismutase**  
 lipid autoxidation bovine superoxide dismutase & inhibition of 1158
- Sweet flag**  
 Acorus calamus effect on green gram seed infested C. chinensis 1185
- Sweet potato proteins**  
 chitosan & storage protein contents of sweet potatoes 994
- Sweet potatoes**  
 Ipomoea batatas, water blanching & darkening/phenol concn./PPO activity in frozen 1024
- Tangerine juices**  
 maturity/processing & bitter compounds in Thai tangerine

- juices 1154
- Taro**
  - composition/used of taro 1022
- Tart apples**
  - juice cocktails from tart apples 1149
- Tartaric acid**
  - antibrowning agent 989
- Taste**
  - perception, receiver operating characteristics use in taste 1182
- Tea**
  - fermentation & theaflavin pigment formation in orthodox/CTC teas 1156
  - oolong tea effect in rabbits 1155
- Teas**
  - black teas, flavour quality GC analysis in Kenyan 1157
  - fermentation & polyphenol oxidase activity in orthodox/CTC teas 1156
- Technology**
  - coconut oils, drying processing technology & extraction of 1167
- Tempeh**
  - fermentation, solid state quinoa tempeh 971
  - Lact. plantarum* & *Staph. aureus* growth inhibition in fermenting tempeh 1017
  - Lactobacillus plantarum* & *Listeria monocytogenes* growth inhibition in fermenting tempeh 997
- Tenderization**
  - chicken rolls, tenderization effect on cured 1119
- Tengolai**
  - 1040
- Terpenes**
  - bacteria for terpenes 984
- Texture**
  - artichoke hearts 1029
  - cowpeas, water hardness & texture of 1000
  - tofu, textural changes in pasteurised stored 1018
- Theaflavin**
  - teas, fermentation & theaflavin pigment formation in orthodox/CTC 1156
- Therapeutic values**
  - fermented milk, bacterial therapeutic values 1057
  - milk products, therapeutic values of indigenous/western fermented, review 1066
- Thermal processing**
  - Kinnow-mandarin orange juices, thermal process evaluation of 1151
- Thermal stability**
  - goat muscles, animal age/thermal stability & collagen from 1107
  - Phaseolus vulgaris*, lectin thermal stability of black turtle soup bean 998
- Threonine aldolase**
  - fish muscle, threonine aldolase in 1139
- Thyme**
  - bacteria-aerobic detn. in thyme 974
- Tocopherols**
  - chicken breast muscles, ionizing radiation & tocopherols in fresh 1120
- Tofu**
  - microbial quality of tofu 1019
  - textural changes in pasteurised stored tofu 1018
- Tomatoes**
  - pigments content measurement light reflectance in tomatoes 1027
  - var. & characteristics of tomatoes 1028
- Totapuri**
  - see Mangoes
- Toxicity**
  - red chillies, toxicity of 1174
- Toxins**
  - pasta, water activity & *Cl.* botulinum toxin production in fresh 1048
- Toxoplasmosis**
  - foodborne toxoplasmosis 982
- Trimethylamine N-oxide demethylase**
  - saithe kidney, trimethylamine N-oxide demethylase of 1142
- Triticum aestivum**
  - see Wheat
- Trogoderma granarium**
  - phosphine/methyl bromide ovicidal efficacy against stored *C. maculatus* 1184
- Tryptophan**
  - barytic hydrolysis & detn. of tryptophan 965
- Turkeys**
  - rolls, *Campylobacter jejuni* survival in modified atm. packaged turkey 1126
- Ultrafiltration**
  - whey protein concentrates, inorganic membrane fouling during ultrafiltration of defatted 1084
- Upma**
  - 1040
- Urokinase**
  - milk, urokinase & plasmin activation in ultrafiltered 1071
- Vada**
  - 1040
- Vegetables**
  - domiati cheese with vegetables 1076
- Vicia faba**
  - see Faba beans
- Vigna mungo**
  - see Black gram
- Vigna radiata**
  - see Green gram
  - see Mungbeans
- Vinylguaiacol**
  - orange juices, 4-vinyl guaiacol formation in 1152
- Viscoelasticity**
  - soybean 11S proteins, glucono- $\delta$ -lactone & viscoelasticity of 1012
- Viscosity**
  - fatty acids, carbon dioxide & viscosities of 1160
- Vitamin C**
  - green beans/broccoli, vitamin C in fresh/frozen 1025
- Volatile compounds**
  - broccoli, volatiles of low-oxygen atm. stored 1026
  - duck meat, volatile components of water-boiled 1125
  - guava fruits, volatile compounds of 1031
  - soybeans, volatiles from microwave-treated stored 1011
- Washing**
  - chicken meat, aqueous washing & colour/nutrient quality of mechanically deboned 1121
  - mangoes, washing & insecticide residue decontamination on 1033
- Wastes**
  - biotechnology & stabilization of dairy wastes 983
- Water**
  - cowpeas, water hardness & cooking characteristics of 1000
- Water activity**
  - emulsions,  $a_w$  of food 961
  - pasta, water activity & *Cl.* botulinum toxin production in fresh 1048
- Weaning foods**
  - centrally processed weaning food



use in developing countries 1143

## **Wheat**

soft bread, hard wheat for 1044

*Triticum aestivum*, fibre content  
of Indian 992

## **Wheat flour**

fibre content in Indian wheat  
flour 992

## **Whey protein concentrates**

inorganic membrane fouling during

ultrafiltration of defatted whey

protein concentrates 1084

yoghurts, composition/consumer  
acceptance of whey protein

concentrate based frozen 1087

## **Wheys**

biotechnology & whey utilization  
983

hydrolysed lactose whey in food  
processing 1083

## **Wines**

pomegranates, wine from 1148

yeast/immobilization technology &  
flavour development in wines 1144

## **Yam proteins**

chitosan & storage protein

contents of yams 994

## **Yeasts**

beverages, yeast & flavour

development in fermented 1144

flavour/flavour enhancers from  
yeasts 985

food-borne yeasts, physiological  
characteristics & identification  
of 981

nucleoproteins 980

## **Yersinia enterocolitica**

dairy plant environments, *Y.*

*enterocolitica* in 1053

## **Yoghurt-like products**

production of yoghurt-like  
products 1054 1055

## **Yoghurts**

bacterial therapeutic value in  
yoghurts 1057

composition/consumer acceptance  
of whey protein concentrate

based frozen yoghurts 1087

consumer acceptability prediction  
of yoghurts 1086

volatile flavour compounds of  
yoghurts 1088

## **Zea mays**

see Bajra

## **Zymomonas mobilis**

ethanol production,

*Zymomonas mobilis* & cassava

starch hydrolysate for 1021





1197

Sarkar (B). **Role of states in the growth of food processing industries.** *Indian Food Packer* 46(5); 1992; 80-82

The role of West Bengal government in the growth of food processing industries is analysed. Efficient management, innovation, adequate R&D input, quality consciousness and linkage with indigenous and foreign market are suggested to create a better future for food processing industries. The setting up of the Ministry for Food Processing Industries, the introduction of self employment scheme for the registered unemployed; inviting entrepreneurs to take up food processing units are some of the other steps taken already in this direction. GS

1198

Joshi (SV). **Role of states in the growth of food processing industries.** *Indian Food Packer* 46(5); 1992; 83-85

Reports (i) the reasons for poor food production and processing, (ii) the factors that determine the success of the small scale processors, (iii) the role of Maharashtra State in the growth of food processing industries, and (iv) the work done by Nagpur Orange Growers' Association and Maharashtra Fruit Corporation. GS

1199

Jakhu (R). **Role of states in the growth of food processing industries.** *Indian Food Packer* 46(5); 1992; 86-89

Highlights steps taken by Haryana Government in creating essential infrastructure for the growth of fruit and vegetable processing industries; the role of Haryana Agro Industries Corp. Ltd., as a nodal agency for promotion of agro-based industries; the new industrial policy for promotion of such industries; the role of Haryana Warehousing Corp. for cold storage; schemes for getting refrigerated vans for fruit transportation; government subsidies and octroi exemptions; single window services to simplify procedures; power projects; and development and marketing efforts by Haryana State Agricultural Marketing Board. GS

1200

Natesan (kP). **Role of states in the growth of food processing industries.** *Indian Food Packer* 46(5); 1992; 90-92

Highlights the present scenario of Indian food processing industry with an annual growth of 6% in food products; lack of consistency in performance; limited presence in world markets and fewer consistent buyers in the export scene. Suggests the need for paying more attention to sorting, grading, storage, processing, transportation and marketing; giving credit support to the entrepreneurs; developing special purpose industrial estates to provide subsidised infrastructure; conducting training programmes for the entrepreneurs; operating a databank to disseminate information of vital interest; formation of an agency in each state equipped with a technical cell, financial cell, information cell and a training cell, which should work under the Ministry of Food Processing Industry, Government of India; development of cold storage facilities for potato, apple and few other vegetables and fruits; and preservation of freshness of vegetables and fruits by refrigerated or insulated transportation. GS

1201

Lsalsangzuala (J). **Role of states in the growth of food processing industries.** *Indian Food Packer* 46(5); 1992; 103-105

Lack of infrastructural facilities, high cost of transportation and insufficient power supply are some of the problems faced by Mizoram. However, the government has launched several schemes and projects on pineapple, maize, ginger, chillies, turmeric, tapioca and passion fruit. The Mizoram Food and Allied Industries Corporation Ltd., looks after the Department of Food and Vegetable Processing Industries (including freezing and dehydration); food grain milling industries; processing and refrigeration of poultry and meat products; and financing of food and allied industries. GS

1202

Molla (AR). **Role of states in the growth of food processing industries.** *Indian Food Packer* 46(5); 1992; 106-107

Highlights the role of West Bengal State in the growth of food processing industries such as setting up of an independent department for food processing industries for the first time in India; lead taken by the State in the sector of small scale industries; and preparation of information, data, process technologies and projects. Suggests establishment of information cell in Calcutta for the eastern and north-eastern states to expediate the assistance given by the Ministry of Food Processing Industries under the plan; and promote development schemes for tiny/cottage industries in West Bengal. GS



1203

Stevenson (MH). **Progress in the identification of irradiated foods.** *Trends in Food Science and Technology* 3(10); 1992; 257-262

The development of methods for identifying irradiated food enhances consumer confidence in irradiation; help the governments to enforce labelling regulations; and assist in the promotion of international trade in irradiated foods. The methods thermoluminescence, electron spin resonance (ESR) spectroscopy and formation of long-chain hydrocarbons and 2-alkylcyclobutanones from lipids in foods, which are currently being developed are discussed in the review. 35 references. BV

## FOOD PROCESSING

1204

Rahman (MS). **Osmotic dehydration kinetics of foods.** *Indian Food Industry* 11(5); 1992; 20-24

The study deals with information on osmotic dehydration kinetics of foods which can be used in food industry for design and control purposes; its application in food industry (quality improvement, energy efficiency, reduction in packaging and distribution costs, avoiding chemical treatment, product stability during storage). Factors affecting osmotic dehydration such as type of osmotic agent, concn. of osmotic sol., temp. of osmotic sol., properties of solute used in osmosis, agitation of osmotic sol., geometry of the material, osmotic sol. and food mass ratio, physical and chemical properties of food materials, and the process design and control of osmotic dehydration kinetics are also considered in the study. CSA

1205

Azuara (E), Cortes (R), Garcia (HS) and Beristain (CI). **Kinetic model for osmotic dehydration and its relationship with Fick's second law.** *International Journal of Food Science and Technology* 27(4); 1992; 409-418

A two-parameter equation was developed from mass balance considerations and used to predict the kinetics of osmotic dehydration and the final equilibrium point. The model was tested using kinetic data from ten different experiments and was able to predict water loss and solids gained over long periods of drying. The final equilibrium point was estimated using data obtained during a relatively short period of time. Simple equations were obtained when the model was related to Fick's

second law for non-steady one-dimensional diffusion through a thin slab, and apparent diffusion coeff. were readily estimated from these equations. AA

## FOOD PACKAGING

1206

Narayanan (PV). **Newer concepts in packaging - relevance to food packaging in India.** *Indian Food Industry* 11(5); 1992; 34-36

### Packaging materials

1207

Olafsson (G), Jagerstad (M), Oste (R) and Wesslen (B). **Delamination of polyethylene and aluminium foil layers of laminated packaging material by acetic acid.** *Journal of Food Science* 58(1); 1993; 215-219

### LDPE

1208

Nielsen (TJ), Jagerstad (IM) and Oste (RE). **Study of factors affecting the absorption of aroma compound into low-density polyethylene.** *Journal of the Science of Food and Agriculture* 60(3); 1992; 377-381

A supercritical fluid extraction/gas chromatography method has been used to study the influence of different factors on the absorption of aroma compounds into LDPE. Factors studied included concn. of aroma substances, storage temp., pH and interactive effects of different food components. There were no significant differences in the partition coeff. when the concn. of the flavours was varied between 0.1 and 10 mg kg<sup>-1</sup>. The storage temp., however, affected the absorption significantly ( $P < 0.05$ ), approx. twice as much was absorbed at 75°C compared with 5°C. Acidification to pH 3 with acetic acid did not significantly alter the amounts of the aromas being absorbed. Further, when occurring alone in the model solutions the aroma substances had much larger partition coeff. than when in mixtures with others, indicating an antagonistic effect of different aroma compounds on absorption. Olive oil and, thereby, the flavours dissolved in the oil, were absorbed in large amounts by the plastic. Extractions of plastic films stored in conc. apple juice were successfully carried out. In addition to many unknown substances, 9 of the 10 aromas used in the model solution were detected in the plastic stored in conc. apple juice. AA



1209

Rangarao (GCP). **Retortable plastic packaging for thermo-processed foods.** *Indian Food Industry* 11(6); 1992; 25-32, 36

The characteristics of retortable plastic packages consisting of heat-resistant plastic layers with or without Al foil and their ability to be thermo-processed to result in shelf-stable food products with less energy and material costs and the added convenience of reheating like the boil-in-bag product are discussed. Aspects covered are the materials used for making retort pouches, pouch design and fabrication, production considerations, production systems, retort pouch products, quality and shelf-life and semi-rigid containers. CSA

## FOOD ENGINEERING AND EQUIPMENT

1210

Sun (X), Litchfield (JB) and Schmidt (SJ). **Temperature mapping in a model food gel using magnetic resonance imaging.** *Journal of Food Science* 58(1); 1993; 168-172, 181

Two dimensional temp. maps of a model food gel (agar, microcrystalline cellulose, and water, 1.95:6.55:200), were obtained by MRI during heating and cooling. The molecular pseudo self-diffusion coeff. could be used as a temp. indicator. The temp. coeff. using the D\* method was 13%/°C. The error in the MRI measurement was 1°C with 1.5 mm<sup>2</sup> spacial resolution. The results by MRI were in good agreement with measurements by thermocouples. The max. difference between them was 1.26°C. MRI is a promising new technique to study heat transfer and to measure thermal properties of foods. SRA

## Equipments

1211

Abichandani (H), Dodeja (AK) and Sarma (SC). **A multiple merit heat exchanger for dairy and food industries.** *Indian Food Industry* 11(6); 1992; 22-24

The multiple merits and versatility of thin film scraped surface heat exchanger and its potential application in food industries for lumpy products, viscous products, sticky products and crystallizing products as well as its specific applications in dairy industries for continuous ghee making, continuous khoa making, lactose manufacture and UHT processing of milk is described in this article. CSA

1212

Tong (CH), Sheen (S), Shah (KK), Huang (VT) and Lund (DB). **Reference materials for calibrating probes used for measuring thermal conductivity of frozen foods.** *Journal of Food Science* 58(1); 1993; 186-189, 192

Reference materials which contained either 8% or 10% bentonite pastes and very fine pure copper powder (300 mesh, 30-55%), provided thermal conductivities ranging from 0.9 to 1.9 W/mK. These materials were used to calibrate probes for measuring thermal conductivity of frozen food materials. Thermal conductivity values measured by the steady-state (parallel plate) method, the unsteady-state heat transfer (heating curve) method, and the probe method agreed within 5%. Although experimental density and heat capacity data of copper-filled bentonite pastes agreed with a mass average value of component properties, measured thermal conductivity values were much lower than the volume fraction average values. AA

## ENERGY IN FOOD PROCESSING

Nil

## FOOD CHEMISTRY AND ANALYSIS

### Chemistry

1213

Izzo (HV) and Ho (C-T). **Peptide-specific Maillard reaction products: a new pathway for flavour chemistry.** *Trends in Food Science and Technology* 3(10); 1992; 253-257

Amino acids (AA) bound in proteins and peptides play a significant role in the generation of flavours in foods during heating. Aspects discussed in this review include: the role of 'free' and 'bound' AA in aroma compounds development, peptide-specific aroma generation (Pyrazinone formation), and inhibition of pyrazinone formation (structural constraints dictate the volatiles formed). 20 references. BV

1214

Bell (LN) and Labuza (TP). **pH of low-moisture solids.** *Trends in Food Science and Technology* 3(10); 1992; 271-274

Reviews the role of pH on food stability and processing; the traditional approach to

measurement of pH in low-moisture solids; the use of surface glass electrodes without the addition of water to get a better indication of pH of low-moisture systems; and a comparison of pH values of dehydrated solid systems derived by various methods, inhibition of microbial growth by a combination of reduced pH and  $a_w$ . 25 references. GS

## Chemistry (Analytical)

1215

Iyengar (V). **Preparation of food and agricultural reference materials for analytical quality assurance.** *Indian Food Industry* 11(6); 1992; 20-21

The implications of various factors (justification for a particular reference material (RM) matrix, anticipation of the analytical intricacies, formulation of a work plan, procurement of chemicals and supplies, preparation and packaging of the RM, tests for homogeneity and chemical characterization and certification) as they relate to preparation and certification of food and agricultural RMs are addressed in this communication. The primary focus is on the inorganic constituents in food related analytical quality assurance materials. CSA

## FOOD MICROBIOLOGY AND HYGIENE

### Microorganisms

1216

Arihara (K), Kushida (H), Kondo (Y), Itoh (M), Luchansky (JB), Cassens (RG). **Conversion of metmyoglobin to bright red myoglobin derivatives by *Chromobacterium violaceum*, *Kurthia* sp., and *Lactobacillus fermentum* JCM1173.** *Journal of Food Science* 58(1); 1993; 38-42

Lactic acid bacteria (LAB) and various bacteria isolated from the environment were screened on microbiological media for the ability to convert brown metmyoglobin to more desirable bright red derivatives. Of 1,550 environmental isolates tested, two isolates (*Kurthia* sp. K-22 and *Chromobacterium violaceum* K-28) were recovered which consistently converted metmyoglobin to more desirable colour derivatives as characterized spectrophotometrically. Strains K-22 and K-28 produced oxymyoglobin and nitric oxide myoglobin, respectively. Of 347 LAB tested, one strain (*actobacillus fermentum* JCM1173) was identified that generated nitric oxide myoglobin. These data indicate certain bacteria can effectively convert

metmyoglobin to more red forms, and establish the potential of bacterial systems for preserving or improving the colour of meat products. AA

1217

Sapru (V), Smerage (GH), Teixeira (AA) and Lindsay (JA). **Comparison of predictive models for bacterial spore population resources to sterilization temperatures.** *Journal of Food Science* 58(1); 1993; 223-228

Comparisons of characteristics of recent models and the conventional model of bacterial spore populations during thermal sterilization showed the conventional model was inadequate for general representation because it lacks activation of dormant spores. New models accounting for activation differed in other assumptions but obviated heat shock of indicator spores required when using the conventional model in validations of thermal sterilization. Comparisons of rate constants and simulated and experimental responses of models of *B. stearothermophilus* spores in constant and dynamic temp. showed one new model was more general, more accurate and preferred. Arrhenius equations accurately described temp. dependencies of all rate constants of that model. AA

### Bacteria

1218

Buchanan (RL) and Klawitter (LA). **Characterization of a lactic acid bacterium, *Carnobacterium piscicola* LK5, with activity against *Listeria monocytogenes* at refrigeration temperatures.** *Journal of Food Safety* 12(3); 1992; 199-217

A lactic acid bacterium (LK5) originally isolated from raw ground beef was characterized in relation to its ability to inhibit the growth of *L. monocytogenes*. The isolate, which was identified as *Carnobacterium piscicola*, inhibited the growth of 17 of 21 strains of *Listeria* (*L. monocytogenes*, *L. innocua*, *L. ivanovi*, *L. welshimeri*, and *L. grayii*). Its activity was not due to either acid or hydrogen peroxide production, but was related to the production of a heat stable bacteriocin. The isolate was most active against *L. monocytogenes* at refrigeration temp. due to the combined effect of the pathogen's increased susceptibility, LK5's rapid growth rate, and enhanced bacteriocin production at low temp. Examination of the effect of inoculum ratios in co-cultures of *C. piscicola* LK5 and *L. monocytogenes* Scott A indicated that the lactic acid bacterium was active against *L. monocytogenes* even when the initial level of the pathogen was 100-fold greater. Evaluation of the impact of oxygen available ty,



initial pH, and sodium chloride content on the effectiveness of LK5 suggested that the isolate could be used to suppress the growth of *Listeria* in a variety of refrigerated foods. AA

1219

Buchanan (RL) and Klawitter (LA). Effectiveness of *Carnobacterium piscicola* LK5 for controlling the growth of *Listeria monocytogenes* Scott A in refrigerated foods. *Journal of Food Safety* 12(3); 1992; 219-236

Eight foods, including UHT pasteurized milk, raw ground beef (sterile and nonsterile), canned dog food, pasteurized crabmeat, chicken roll, frankfurters and canned creamed corn were inoculated with 10 cfu/g *L. monocytogenes* Scott A, with and without 10 cfu/g LK5, and incubated at 5 and 19°C. Samples were removed periodically and assayed for total aerobic plate count using Brain Heart Infusion Agar and *L. monocytogenes* using Vogel-Johnson Agar or Modified Vogel Johnson Agar. The growth of *L. monocytogenes* was suppressed in milk, dog food, crabmeat, creamed corn, and frankfurters stored at 5°C. The microorganism was less inhibitory at 19°C. In sterile raw ground beef, LK5 inactivated the pathogen at 5°C and prevented its growth at 19°C. No activity attributable to LK5 was observed in refrigerated nonsterile ground beef or chicken roll; however, these products did not support the psychrotrophic growth of the pathogen even in the absence of LK5. LK5 was most effective in product where the background micro flora was reduced by either thermal processing or irradiation treatment. The results show that *C. piscicola* LK5 can be used to control the growth of susceptible strains of *L. monocytogenes* in a variety of foods particularly at refrigeration temp. CSA

### **Clostridium perfringens**

1220

McClane (BA). *Clostridium perfringens* enterotoxins: Structure, action and detection. *Journal of Food Safety* 12(3); 1992; 237-252

*C. perfringens* Type A is one of the most common causes of food-borne disease in the USA. Diarrheal and cramping symptoms associated with this illness are caused by a protein enterotoxin (CPE). Recently, diagnosis of *C. perfringens* food poisoning has been improved by the development of direct assays to detect CPE in feces or CPE production by food or fecal isolates of *C. perfringens*. The enterotoxin has a membrane-active action which appears to involve four early steps: (1) binding of CPE to a mammalian receptor, (2) insertion of CPE into membranes, (3) formation of a complex between

CPE and mammalian membrane proteins and (4) onset of toxin-induced ion and water permeability changes. CPE has a unique amino acid sequence, and recent studies have indicated that the receptor-binding region of enterotoxin is localized at the extreme C-terminus. Further studies of the CPE structure versus function relationship may facilitate development of vaccines for human or veterinary usage. AA

### **Fungi**

#### **Mushrooms**

1221

Zakia Bano, Rajarathnam (S) and Shashirekha (MN). **Mushrooms - unconventional single cell protein for a conventional consumption.** *Indian Food Packer* 46(5); 1992; 20-31

Outlines the growth and life cycle of mushrooms, their morphology and development; edibility; chemistry, nutritional and biomedical properties; preservation and processing techniques like refrigeration, deep freezing, pickle making, dehydration, canning and fermentation, and their role as an unconventional single cell protein for human consumption. GS

1222

Briones (GL), Varoguaux (P), Chambroy (Y), Bouquant (J), Bureau (G), Pascat (B). **Storage of common mushroom under controlled atmospheres.** *International Journal of Food Science and Technology* 27(5); 1992; 493-505

The effect of controlled atm. (CA) on the shelf-life of the common mushroom (*Agaricus bisporus*) was assessed using 6 parameters correlated with its commercial qualities. Low CO<sub>2</sub> concn. (up to 2.5%) reduced brown discolouration compared to the control in air. Higher CO<sub>2</sub> concn. enhanced both internal and external browning. Low O<sub>2</sub> concn. reduced growth of micro-organisms, including pseudomonads. Respiration rate, when the mushrooms are placed again in normal air, is proportional to CO<sub>2</sub> concn. during storage suggesting that CO<sub>2</sub> exhibits a phytotoxic effect on mushrooms. A lower mannitol content was noted in mushrooms stored under CA than those stored in air (control). Mushrooms stored in a 5% CO<sub>2</sub> atm. for 7 days did not break their veil but their texture was very soft and spongy. Texture losses decreased when CO<sub>2</sub> concn. increased. AA



## Preservatives

## Nisin

1223

Kalra (MS), Matta (H) and Singh (A). **Nisin as an aid in extending shelf life of various foods.** *Indian Food Packer* 46(4); 1992; 5-15

Reviews the properties of nisin, mode of action, potential applications of nisin. Potential applications of nisin as a preservative in various foods like hard processed cheeses, pasteurised and sterilized milks, milk products (yoghurt, cream, khoa, kheer, milk pudding), canned foods (processed cheese, vegetable and soups), fruits, semi preserved meat, alcoholic beverages and toxicity. 73 references. BV

## CEREALS

## Rice

1224

Itoh (K) and Kawamura (S). **Milling characteristics of parboiled rice and properties of milled rice. Studies on parboiled rice. Part II.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 38(9); 1991; 776-783 (Ja)

The milling characteristics and the properties of milled rice of parboiled brown rice were investigated. The electric power consumption of parboiled brown rice using the abrasive type and friction type mill was higher than that of untreated brown rice. The electric power consumption by abrasive type mill increased with the increase of degree of gelatinization. When the degree of gelatinization was above 30%, the electric power consumption increased steeply. The electric power consumption by friction type mill decreased with the increase of the degree of gelatinization. However, the minimum value of parboiled rice was one and a half times as much as untreated brown rice. The temp. of milled parboiled rice was about 5°C higher compared with untreated materials. The broken kernel rate was higher when the degree of gelatinization was in range of 2 - 40%, while decreased when the degree was more than 50%. As the degree of gelatinization increased, the bulk density and whiteness decreased. The light transmittance, water absorption and colour difference were increased due to increasing the degree of gelatinization. AA

1225

Yasui (T). **Detection of waxy maize starch adulteration in waxy rice cake by use of stable carbon isotope ratio analysis.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 38(9); 1991; 864-870

Waxy rice cake, a popular New Year food in Japan, is occasionally adulterated with waxy maize starch. The stable carbon isotope ratios ( $^{13}\text{C}/^{12}\text{C}$ ) of 132 samples of 71 waxy rice cvs grown in Japan and 54 samples of maize starch have been determined by isotope ratio MS. The  $^{13}\text{C}/^{12}\text{C}$  values of fully milled waxy rice and maize starch ranged from -24.4 to -27.3 parts per thousand (per mil) and from -9.6 to -11.1 per mil, respectively. Rice cakes with  $\delta^{13}\text{C}$  values higher than -24.2 per mil, 3 standard deviations from the mean of fully-milled rice, should be considered adulterated. AA

## Wheat

1226

Arun Kumar (GC). **Wheat conditioning.** *Indian Miller* 23(3); 1992; 9-11

Various types of wheat conditioning viz. cold conditioning, warm conditioning, hot conditioning in order to toughen the bran and mellowing the endosperm and factors influencing conditioning are highlighted. SRA

1227

Gontard (N), Guilbert (S) and Cuq (J-L). **Water and glycerol as plasticizers affect mechanical and water vapor barrier properties of an edible wheat gluten film.** *Journal of Food Science* 58(1); 1993; 206-211

1228

Jood (S) and Kapoor (A-C). **Biological evaluation of protein quality of wheat as affected by insect infestation.** *Food Chemistry* 45(3); 1992; 169-174

Rat growth and nitrogen balance studies were carried with infested wheat caused by mixed population of *Trogoderma granarium* Everts and *Rhizopertha dominica* Fabricius. The result indicated marked decrease in food intake, body wt. gain, food efficiency ratio, PER, nitrogen absorption, biological value, NPV and dry matter digestibility with 50% and 70% infested grain. Grain infestation of 25% level showed only marginal differences. All the above parameters were negatively related to infestation levels. SD



## Wheat flour

1229

Yeh (A-I) and Hwang (S-J). **Effect of screw profile on extrusion-cooking of wheat flour by a twin-screw extruder.** *International Journal of Food Science and Technology* 27(5); 1992; 557-563

The effects of forward-, reverse-, and no-flight screw elements on the residence time distribution, dispersion number, and product properties were investigated in extrusion cooking of wheat flours in a twin-screw extruder. Mean residence times of 46.5s with a forward element increased to 59.6s with a reverse flight and 67.6s with a no-flight element. Dispersion numbers were 0.051, 0.056, and 0.075 respectively. The no-flight element reduced cooking loss and increased the degree of gelatinization of products. AA

## PULSES

1230

Singh (U) and Singh (B). **Tropical grain legumes as important human foods.** *Economic Botany* 46(3); 1992; 310-321

The production, consumption, processing (dehulling and cooking), food uses, chemical composition and the effect of processing (soaking and germination, fermentation, cooking) on the nutritive value of grain legumes such as chickpea (*Cicer arietinum*), pigeon pea (*Cajanus cajan*), mung bean (*Vigna radiata*), Black gram (*Vigna mungo*), curd bean, cowpea (*Vigna unguiculata*), lentil (*Lens esculenta*), soybean (*Glycine max.*), and peanut (*Arachis hypogaeae*) are summarised. Grain legumes as sources of protein, vitamins and minerals; their utilization and diversified food uses are also highlighted. GS

## Bambara groundnut

1231

Brough (SH) and Azam-Ali (SN). **The effect of soil moisture on the proximate composition of bambara groundnut (*Vigna subterranea* (L) Verdc.).** *Journal of the Science of Food and Agriculture* 60(2); 1992; 197-203

Bambara groundnut seeds, produced under five levels of irrigation (0-300 mm range) in a suite of controlled-environment glasshouses, were analysed for their proximate composition. There was no significant effect of water treatment on the seed composition. Mean values (g kg<sup>-1</sup> DM) of dry matter, protein, starch, free sugars, non-starch

polysaccharides and lipids were 8.91, 2.53, 4.28, 0.15, 2.56 and 0.79 respectively. Bambara groundnut protein was deficient in the sulphur amino acids, methionine and cysteine but met the FAO requirements for all other essential and non-essential amino acids. Of the non-starch polysaccharides (NSP) of bambara groundnut, the ratio of insoluble to soluble fractions was 57:43. Cellulose accounted for 36% of the total NSP. Approximately 12.8% of the total NSP was resistant to acid and enzymic hydrolysis. This fraction was attributed to lignified seed coat material and low molecular weight phenolic compounds. Tannin complexes capable of precipitating 142.6 g BSA (bovine serum albumin) per kg seed and trypsin inhibitor activity (13 g kg<sup>-1</sup> DM) were measured in all five bambara groundnut treatments. The presence of these anti-nutrients may have implications for the bio-availability of bambara groundnut protein. AA

## Green beans

1232

Baron (RF) and Penfield (MP). **Panelist texture preferences affect sensory evaluation of green bean cultivars (*Phaseolus vulgaris* L.).** *Journal of Food Science* 58(1); 1993; 138-139, 143

The effects of textural preferences on sensory intensity and hedonic scores assigned by consumer panelists (50 preferred "soft" and 38 "crisp" beans) to green beans of two cvs cooked by 2 methods were studied. Boiled and 'Strike' beans were rated lighter than steamed and 'Mustang' beans. 'Mustang' beans were scored more acceptable for colour, flavour and overall likability. Soft textural preference panelists liked steamed beans less than boiled beans for texture, flavour, and overall likability. Hedonic scores assigned by panelists of crisp textural preference did not differ by preparation method. Selecting panelists without considering textural preferences may influence hedonic but not intensity scores. AA

## OILSEEDS AND NUTS

1233

Naczki (M), Myhara (RM) and Shahidi (F). **Effects of processing on the oligosaccharides of oilseed and legume protein meals.** *Food Chemistry* 45(3); 1992; 193-197

The effects of (alkanol)-hexane, (alkanol/water)-hexane and (alkanol/ammonia/water)-hexane extraction systems on the removal of low-mol. wt. sugars from soybean, cottonseed, field pea and mung bean were



studied. The results indicated that ROH/amononia processing greatly reduced the content of low-mol. wt. sugars of oilseeds and legumes. The reducing flatulence activity may improve the nutritional quality of the resultant meals. SD

#### Nutmegs

1234

Takahashi (T). **Aflatoxin contamination in nutmeg: Analysis of interfering.** *Journal of Food Science* 58(1); 1993; 197-198

A mixture of ground nutmeg and ground cinnamon leaves was subjected to TLC; spots appeared on the TLC plate hampered the detection of aflatoxins. These spots represented oxidation or heat-induced degeneration of the cinnamon leaves. In this study, aflatoxins were detected in 29 (43%) of 67 samples. Aflatoxin B1 was detected in 29 samples, B2 in 8 samples and aflatoxin G1 in 1 sample. Aflatoxin G2 was not detected in any samples. The mean aflatoxin B1 concn. was 0.68 µg/kg. BV

#### Sesame

1235

Rajendran (S) and Prakash (V). **Structural stability of  $\beta$ -globulin, the low molecular weight protein fraction from sesame seed (*Sesamum indicum* L.) in alkaline solution.** *Indian Journal of Biochemistry and Biophysics* 30(1); 1993; 15-20

$\beta$ -globulin, a single polypeptide chain of mol. wt. 15,000 plus or minus 1,000, undergoes denaturation in alkaline pH (7.0-13.0), thereby affecting the hydrodynamic properties of the protein, viz., a decrease in sedimentation coeff. from a value of 2.0s to 1.4s at pH 11.3, an increase in reduced viscosity from 0.042 dl/g to 0.158 dl/g at pH 12.6 and a decrease in partial specific vol. resulting in a vol. change of 6.3±1.0 ml/mole residue at pH 11.7. The perturbation of tryptophanyl residues and ionization of tyrosyl residues are preceded by alteration in conformational status of the protein. The fluorescence emission measurements indicate initial unfolding of the protein molecule which exposes the tryptophan and tyrosyl residues to the solvent. The tyrosyl phenolic group ionization is anomalous having a pK int value of 11.2. The reduced viscosity value reaches a plateau region at pH 12.5. AA

#### Soybeans

1236

Matsuura (M) and Obata (A).  **$\beta$ -Glucosidases from soybeans hydrolyze daidzin and genistin.** *Journal of Food Science* 58(1); 1993; 144-147

1237

Kudou (S), Uchida (T) and Okubo (K). **Effect of *Aspergillus niger* on soybean saponins.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 38(9); 1991; 835-841

In order to improve tastes of soybean foods, enzymatic hydrolysis was investigated of soybean saponins as principal constituents possessing undesirable bitter and astringent tastes in soybeans. Microorganisms producing a soybean saponin hydrolyzing enzyme were screened by using 54 strains of *Aspergillus niger*. As a result, *A. niger* 7122 possessing the highest hydrolyzing activity among all strains was selected. The enzymatic hydrolysates from soybean saponins were examined with TLC and HPLC analyses. The soybean saponin A group was partially deacetylated at terminal sugar moieties of the sugar chain linked to C-22 of soya sapogenol A. Other soybean saponins are likely to be hydrolyzed at the glucuronide bond as a result of soya sapogenol B and E being detected in the hydrolysates. Also this result suggested that novel saponins with soya sapogenol E as aglycone might exist in the intact soybeans. The optimum pH for hydrolysis of Bb, a major saponin, was pH 5.0 to 5.5. The enzyme activity was stable at temperatures below 40°C and stable over the pH range of 4.0 to 6.0. AA

1238

Hayashi (N), Hayakawa (I) and Fujio (Y). **Texture evaluation of dehulled whole soybean extrudate treated with a twin-screw extruder.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 38(9); 1991; 842-849

Extrusion cooking of dehulled whole soybean, containing ca. 20% oil, was done through a twin-screw extruder equipped with a cooling nozzle. The effect of various parameters as barrel temp., feed rate and screw speed on the textural quality of the extrudate was investigated and evaluated using the values of shearing force measured with the "blade shear cell" and "physical structure index" which was a modified version of Integrity Index of the FNS test. The concept of "orientation index" or the ratio of parallel to cross-sectional value of blade shear force was introduced, expressing the fiber orientation of extrudate which was strongly affected by the feed rate. The main factor affecting texturization of dehulled whole soybean was found to be barrel temp., optimum at 160°C. AA



## Soy products

1239

Kulkarni (SD) and Joshi (KC). **Potato starch soy blends: Possible effects of starch properties on few aspects of end products.** *Indian Food Packer* 46(4); 1992; 38-47

Describes the properties of potato starch; their utilization in soybased foods like baked, extruded and traditional type; and the advantages of potato-soy blend products which are more nutritious with high protein, oil and starch, require less cooking energy and have better quality, shelf-life and sensory appeal. GS

## Soy milk

1240

Nsofor (LM) and Maduako (O). **Stabilized soy milk for ambient tropical storage: A preliminary report.** *International Journal of Food Science and Technology* 27(5); 1992; 573-576

The shelf-stability of soy milks prepared from sterilized (121°C for 15 min) water-soluble extracts of sprouted-blanching, sprouted-unblanching, and blanching whole soybeans (control) was evaluated; samples were compared for coagulation, pH, and loss of starch. The extract from sprouted-blanching soybeans remained uncoagulated for 6 wks in ambient tropical storage, showed the greatest loss of starch and had the least total solids content (10%). The sprouted-unblanching soybeans produced an extract which coagulated instantly after sterilization at a pH of 5.6, the lowest pH value for treatment and control samples. The control contained the highest total solids (25%), showed least loss of starch and coagulated after 2 days in ambient tropical storage. AA

1241

Murti (TW), Bouillanne (C), Landon (M) and Desmazeaud (MJ). **Bacterial growth and volatile compounds in yoghurt-type products from soy milk containing *Bifidobacterium* ssp.** *Journal of Food Science* 58(1); 1993; 153-157

Soy milk is a favourable medium for the development of bifidobacteria and of mixed cultures traditionally used to manufacture yoghurt. The acidity of soy yoghurt and soy yoghurt + bifidobacteria was acceptable for consumers since the value did not exceed 9 g of lactic acid/kg product. In addition, the pH was 4-4.5, within the range considered optimal for aroma development. *Bifidobacterium* SSP, caused a slight increase in the

acidity of the two cultures. Its presence in cow milk favoured both the streptococci and lactobacilli. In soy milk, bifidobacteria favoured growth of only streptococci. Quantities of volatile products in yoghurt/yoghurt + bifidobacteria were slightly lower than those in yoghurt/soy yoghurt. In all cultures, n-hexanal was almost totally absent. SRA

## Soy proteins

1242

Satija (V), Sood (SM), Sekhon (BS) and Singh (R). **Effect of sodium dedecyl sulphate on 7S fraction of soybean.** *Journal of the Indian Chemical Society* 69(6); 1992; 348-350

Reports the effect of sodium dodecyl sulphate (SDS) on gel-filtration pattern, ultraviolet difference spectra and reduced viscosity of soybean 7S protein. The reduced viscosity gradually increased with increasing concn. of SDS and attained a value of 8.34 ml/g at 10.41 mM SDS concn. Addition of SDS beyond this concn. precipitated the protein. Rapeseed protein showed a max. value of 10.4 ml/g at 17.34 mM SDS, mustard protein showed a steady value of 11.5 ml/g at 17.34 mM SDS concn. Elution profile of gel filtration pattern of 7S protein in the presence of various concn. of SDS indicated that absorbance at 280 nm decreased by higher SDS concn. SRA

1243

Hayashi (N), Hayakawa (I) and Fujio (Y). **Hydration of heat-treated soy protein isolate and its effect on the molten flow properties at an elevated temperature.** *International Journal of Food Science and Technology* 27(5); 1992; 565-571

The relationship between the flow properties of soy protein isolate (SPI) at 140°C, measured using an extrusion viscometer, and changes in the hydration state were investigated. The state of the water in SPI was analysed by measurement of the freezable water content using differential scanning calorimetry (DSC) and by spin-spin relaxation rate (R2) measurements using pulsed NMR. The dependence of the flow properties on the state of water was indicated by the correspondence between the water content at which the flow characteristics of molten SPI changed, and the critical water content indicated by DSC measurement of the minimum freezable water content, and by the inflection point in NMR measurement of the spin-spin relaxation rate (R2). AA

1244

Genovese (MI) and Lajolo (FM). **Composition and structural characteristics of isolated soy proteins**



from broken and damaged seeds. *Journal of Food Science* 58(1); 1993; 148-152, 157

Mechanical damage and fungal attack lead to alterations of seed proteins and consequently, their physico-chemical properties. Isolated soy protein (ISP) from the 3 kinds of seeds had a different composition, as indicated by their unfolded proteins, half cystine content and subunit profile. There was indication of occurrence of hydrolysis of the proteins isolated from altered damaged seeds. The densitometric analysis of the 7S and 11S fractions showed for the 11S fraction the total acid and basic subunits represented approx. 75% of the total isolated protein. For the 7S fraction the sum of  $\alpha$ ,  $\alpha'$  and  $\beta$ -subunits was only 55% of the total for normal and broken and less (39%) for damaged seeds. Isolation and characterization of 7S and 11S fractions partially accounted for changes in physico-chemical properties of the ISP. AA

## TUBERS AND VEGETABLES

1245

McDonough (C), Gomez (MH), Lee (JK), Waniska (RD) and Rooney (LW). **Environmental scanning electron microscopy evaluation of tortilla chip microstructure during deep-fat frying.** *Journal of Food Science* 58(1); 1993; 199-203

When the baked chip was immersed in the fryer, oil immediately coated and clung to the surface and began to move into the chip. As heat built up within the chip, the moisture turned to steam and exited the chip leaving behind a sponge-like network of tunnels which became filled with oil. The transformations occurred within 20 sec. As frying time increased, (1) starch granules with strong birefringence remained on the surface of the chip, (2) starch granules lost birefringence within the chip, and (3) the interior of the chip became smooth and plastic in appearance as protein, starch and lipids interacted to form a continuous phase that hardened upon dehydration. AA

### Root vegetables

#### Carrots

1246

Ramana (SV), Wright (CJ) and Taylor (AJ). **Measurement of firmness in carrot tissue during cooking using dynamic, static and sensory tests.** *Journal of the Science of Food and Agriculture* 60(3); 1992; 369-375

The suitability of an oscillatory shear technique to distinguish the rigidity of carrot tissue of different maturity and morphological origin has been evaluated. The rigidity was related to apparent  $G'$  ( $G' =$  shear modulus) of tissues and growing regions showed greater rigidity than mature tissue. Despite these differences in raw tissue, all samples exhibited a rapid decline in apparent  $G'$  around 55-60°C when small discs of these tissues (2 mm thick x 13 mm dia) were heated from 20 to 80°C. Force-compression studies on carrot tissue were performed using a TA.XT2 texture analyser. Carrot discs (3 mm thick x 20.6 mm dia) showed a linear elastic region up to 37% of compression at 20°C. When discs of carrot tissue were heated in the range 20-80°C, they showed a gradual decline in modulus of elasticity ( $E$ ) unlike apparent  $G'$ . Heated-stage microscopic studies were carried out to examine the reasons for rapid changes in  $G'$  of carrot tissue during heating. As the temp. increased from 20 to 60°C, thickening of the cell wall was observed with disruption of plasma membrane and loss of cellular integrity evident around 60°C. The relationship between sensory analysis and the rheological parameters was also studied. There was a gradual decline of both the apparent  $G'$  and  $E$  values as well as the sensory score as carrots were cooked in boiling water but, after 20 min, plateau values were observed. There was a linear relationship between sensory score and apparent  $G'$  and  $E$  values ( $r = 0.86$  to  $0.93$ ) suggesting the instrumental methods used in this investigation were able to measure the same intensity of textural characteristics as perceived by a taste panel. AA

1247

Babic (I), Hilbert (G), Nguyen-The (C) and Guiraud (J). **The yeast flora of stored ready-to-use carrots and their role in spoilage.** *International Journal of Food Science and Technology* 27(4); 1992; 473-484

Spoilage of ready-to-use grated raw carrots packaged in polymeric films and stored at 10°C was investigated for involvement of yeasts. *Cryptococcus albidus* was only isolated during the first 3 days of storage, increasing to levels of  $10^5 - 10^6 \text{ g}^{-1}$ . *Candida lambica* was more commonly isolated after 3-7 days of storage, and reached  $10^7 - 10^8 \text{ g}^{-1}$  after 12 days. *C. sake* was present throughout storage, increasing from  $10^5 - 10^6$  after 3 days to  $10^7 - 10^8$  after 12 days. In some samples, *Candida parapsilosis* and *Candida tropicalis* were also isolated at levels similar to *C. sake*. All the yeasts isolated at the end of storage were fermentative species and their metabolism was characterized with a Warburg apparatus. Neither the number of yeasts nor the composition of the yeast flora were related to the deterioration of the product. Although *C. lambica* inoculated on grated carrots caused spoilage after 12 days at 10°C, the high  $O_2$



permeable film was most effective in reducing exudate. AA

## Cassava

1248

Waliszweski (KN), Alvarado (MG) and Medina (JDLC). **Kinetics of enzymic hydrolysis of cassava flour starch - optimization and modelling.** *International Journal of Food Science and Technology* 27(4); 1992; 465-472

The kinetics of cassava flour hydrolysis was modelled using Miles Taka-Therm L-170 alpha amylase and Diazyme L-200 glucoamylase to produce glucose syrup. Max. starch concn. was 33% due to a controlled process of flour gelatinization by gradual temp. increase, and parallel starch hydrolysis by thermostable alpha-amylase activity, preventing excess viscosity. The time of hydrolysis was two and half hours of alpha-amylase activity and 36 h of glucoamylase activity with the final yield of 90-93% of glucose. Exponential hyperbolic models were obtained to predict the kinetic of hydrolysis both amylase and glucoamylase with a generalized correlation coeff. > 0.94. GS

## Tubers

### Potatoes

1249

Magee (TRA) and Wilkinson (CPD). **Influence of process variables on the drying of potato slices.** *International Journal of Food Science and Technology* 27(5); 1992; 541-549

Investigation of the effects of varying air velocity, slice thickness, and pre-treatment with NaCl chloride solutions and surface active agents on drying potato slices indicated that the drying occurred entirely in the falling rate period and was controlled by the mechanism of liquid diffusion. The rate of drying, and therefore the diffusion coeff., increased with the addition of NaCl and surface active agents. Diffusion coeff. were also influenced by air velocity and slice thickness, suggesting that the rate of drying of potato slices is controlled by a combination of internal and external resistances. AA

1250

Mondy (NI), Wurm (CM) and Munshi (CB). **Moist and dry heat reduce isopropyl N-(3-chlorophenyl) carbamate (CIPC) residue in potatoes.** *Journal of Food Science* 58(1); 1993; 132-133, 163

Moist (boiling and pressure-cooking) and dry heat (baking with and without foil, and microwaving) were compared as to their effect on CIPC retention in potatoes. Tubers were dipped in a 1% emulsion of CIPC for 5 min. prior to processing and stored at 5°C for 0, 1 and 2 months. All processing methods significantly ( $p < 0.01$ ) reduced CIPC residue in potatoes. Moist heat methods reduced CIPC more than dry heat. Boiling resulted in significantly ( $p < 0.01$ ) greater reduction of CIPC than pressure-cooking while baking without foil resulted in greatest reduction of CIPC followed by microwaving and baking with foil. The peel localized 20 times more CIPC residue than the cortex. AA

1251

Okazaki (T), Suzuki (K), Maeshige (S) and Kubota (K). **Kinetic studies on softening phenomena of potato during thermal processing.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 38(9); 1991; 784-788

Potato samples (7 mm diam. x 30 mm length) were cooked in water at a temperature from 85 to 105°C with a cylindrical heating vessel in a constant temp. bath. Changes in a temp. at the center of the potato were measured with a CA thermocouple. The cooking process consisted of unsteady heating and cooling periods, and constant temp. cooking periods. Since the cooking of potato progressed during the unsteady thermal process, cooking time for it was corrected to the value of cooking time under constant temp. Changes in hardness during cooking were measured as an index for cooking value. The hardness of potato was slightly increased (about 14% of initial value) in the initial stage of heating. Then potato softened with time. The softening process was divided into two stages of different mechanisms. The 2nd stage of softening followed with a time interval after the 1st stage. The interval decreased with the increase in cooking temp. Hardness of the sample decreased to about 1/10 of the initial value at the end point of the 1st stage, irrespective of the cooking temp. The softening behaviour in both stages could be analysed with the pseudo-first order rate equation. The activation energies for the 1st and 2nd stages of softening were 171 and 123 kJ/mol, respectively. Logarithmic values of the starting time,  $t$ , of the 2nd stage were correlated linearly with cooking temp.  $T$ , and expressed as  $\log t = 8.85 - 6.33 \times 10^{-3}T$ . AA

1252

Liu (H). **A kinetic study of salt diffusion in potato at high temperature.** *International Journal of Food Science and Technology* 27(4); 1992; 443-455



The apparent diffusion coeff. of sodium chloride in potato was determined from the change in average concn. in cylindrical potato pieces with time when surrounded by salt solution of between 1 and 5% concn. Measurements were made at temp. in the range 50-120°C. The apparent diffusion coeff. of salt in potato is temp. dependent and follows the Arrhenius equation, with activation energies of 20-24 kJ mol<sup>-1</sup>, decreasing with increasing concn. within the temp. range 70-120°C. The apparent diffusion coeff. increases with concn. Below 60°C the Fickian diffusion equation did not predict the experimental results accurately because of changes in the dimensions and structure of the potato caused by osmosis. AA

## Yams

1253

Asemota (HN), Wellington (MA), Odutuga (AA) and Almad (MH). **Effect of short-term storage on phenolic content, o-Diphenolase and peroxidase activities of cut yam tubers (*Dioscorea* sp.).** *Journal of the Science of Food and Agriculture* 60(3); 1992; 309-312

The effect of short-term storage on the protein, P and phenolic content as well as peroxidase and o-diphenolase activities of cut, harvested Jamaican yam (*Dioscorea* sp) tubers (*D. rotundata*, *D. alata* and *D. cayenensis*) was studied. There was an initial increase in the total phenolic content up to the third week of storage followed by a gradual decrease to the sixth week. Phenolic content was found to be highest in *D. cayenensis* followed by *D. rotundata* and *D. alata*. The activities of peroxidase (EC 1.11.1.7) and o-diphenolase (EC 1.10.3.1) increased steadily up to the third week of storage and thereafter decreased to the fifth wk. The intensity and rapidity of browning in tubers when cut, correlated very closely with the tuber o-diphenolase and phenolic content levels while the onset of rotting correlated with the peroxidase activity levels in the sp. studied. AA

## Vegetables

1254

Poonam Aggarwal and Saini (SP). **Effect of retort processing on the chemical composition and organoleptic quality of ready-to-eat sag prepared from new *Brassica* cultivars.** *Indian Food Packer* 46(4); 1992; 34-37

Physico-chemical changes evaluated during processing of 5 var. of *Brassica*, viz. Toria-ITSA, Brown sarson, Chinese cabbage, RLM-240 and Gobhi sarson, into canned sag indicated that the cv. Brown sarson and RLM-240 were the best for

canning into sag due to better flavour and colour retention even after 6 months storage although the 3 other var. were also suitable for cooking and canning. GS

1255

Majeed (SA) and Nagegowda (V). **Vegetable production: Time for new strategies.** *Indian Food Packer* 46(5); 1992; 35-44

Outlines the place of India in world vegetable production (second, next to China, with a production of about 48 million t.); constraints in vegetable production, strategies for increasing production; role of processing industries; yield of vegetable crops in different regions of the world; export potential of vegetable crops from India; and new projects to improve vegetable production and processing in India. GS

## Broccoli

1256

Barth (MM), Kerbel (EL), Perry (AK) and Schmidt (SJ). **Modified atmosphere packaging affects ascorbic acid, enzyme activity and market quality of broccoli.** *Journal of Food Science* 58(1); 1993; 140-143

The effects of elevated CO<sub>2</sub> concn, developed during modified atm. packaging, on ascorbic acid and chlorophyll content, enzyme activities and texture of broccoli during simulated retail conditions (10°C) was studied. Concn. with in packages monitored by GC were 8% CO<sub>2</sub> and 10% O<sub>2</sub>. Packaging of broccoli spears resulted in greater ascorbic acid retention providing better vitamin C content for the consumer, and greater chlorophyll retention contributing to greener appearance. Packaging with polymeric films was found acceptable for postharvest storage. SRA

## Leafy vegetables

### *Amaranthus caudatus*

1257

Sweet (SS) and Guruprasad (KN). **Regulation of betacyanin synthesis by GA3 and CCC in *Amaranthus caudatus* L.** *Indian Journal of Experimental Biology* 31(2); 1993; 168-172

Betacyanin synthesis in *A. caudatus* seedlings is inhibited by gibberellic acid (GA3) and promoted by cholorocholine chloride (CCC). When both substances are given together, CCC reverses the inhibition caused by GA3. A greater amount of total free amino acids, in particular tyrosine, was present



in CCC treated seedlings, while GA3 treated seedlings showed a lower level of total free amino acids and tyrosine compared to controls grown on distilled water. In experiments with radioactive precursor of the pigment 14C-tyrosine, GA3 enhanced incorporation of precursor to protein while CCC enhanced incorporation into betacyanin. CCC also reversed the effect of GA3 on diversion of 14C-tyrosine away from the site of pigment synthesis. It is suggested that GA3 and CCC regulate the synthesis of betacyanin by causing the diversion of precursors. AA

## Pumpkin

1258

Essien (AJ), Ebana (RUB) and Udo (HB). **Chemical evaluation of the pod and pulp of the fluted pumpkin (*Telfairia occidentalis*) fruit.** *Food Chemistry* 45(3); 1992; 175-178

Analysis of fresh pod and pulp showed moisture, (91.30%, 92.80%), crude protein (1.40%, 1.30%), crude fibre (0.85%, 0.46%), ether extract (0.50%, 0.30%), ash (0.40%, 0.30%) and nitrogen-free extract (5.60%, 4.84%) respectively. Fermentation (0.120 h) increased the percentage crude protein, decreased the crude fibre and ether extract contents. Mineral elements in pod and pulp were Na (10.50; 27.50), K (1584; 2320), Mg (665.90; 147.20), Ca (196.7; 182.10), P (30.00; 260.00), Fe (16.76; 13.86), Zn (5.31; 4.30), Cu (1.26; 1.13) and Mn (0.07; 0.06) mg/100 g dry matter. SD

## Tomatoes

1259

Porretta (S), Carpi (G), Dall'Aglio (G) and Ghizzoni (C). **Use of ultrafiltration for preparing improved tomato pulp.** *International Journal of Food Science and Technology* 27(4); 1992; 427-433

The characteristics of high-quality tomato pulp (commercial def.: crushed or diced tomatoes with about 30% tomato juice as packing medium) canned with tomato juice pulp enriched by ultrafiltration as packing medium were compared with those covered with conventional vacuum-concentrated juice. Both hot- and cold-break products were prepared and those containing 20% serum-reduced packing juice proved to be the best, showing no signs of syneresis on storage and with improvements in sensory properties, colour and non-enzymatic browning; some volatile components were reduced. AA

## FRUITS

1260

Eipeson (WE) and Bhowmik (SR). **Indian fruit and vegetable processing industry - potential and challenges.** *Indian Food Packer* 46(5); 1992; 7-12

Reports the production statistics of fruit and vegetables in leading countries. India stands second after Brazil in fruit production (27.8 million t.). Mango occupies the top position with an annual production of 10 million t. (65% of the world mango production), followed by banana, citrus, grapes, apples, pineapples and guava. Among vegetables potato occupies the top most place with 16 million t. production, followed by tapioca, onion, okra, tomato, knolkhol, cabbage, brinjal and garlic. Minor fruits grown in India; output and share of some major FPO licences; per capita consumption of fruit juice and nectar in world markets (1985-1989); market potential, technology upgradation, policy support and future trends of the industry are also presented. GS

1261

Kejriwal (NM). **Development of fruit and vegetable processing industries and their export potential.** *Indian Food Packer* 46(5); 1992; 13-19

Outlines the situation relating to poor fruit/vegetable yields and the potential for better yield in India or abroad; the estimated land degradation due to deforestation in late 1970s; trends in the production of fruits and vegetables in India; post-harvest losses of tuber, fruits and vegetables; quantity of different fruit and vegetable products produced by FPO licences; export of major fruit and vegetable products and major destinations and future trends in fruit and vegetable trade. GS

1262

Prahlad (SN). **Emerging trends in the fruit and vegetable processing industries-industry/university co-operative research.** *Indian Food Packer* 46(5); 1992; 32-34

Presents the problem of Indian food processing industries due to lack of infrastructure such as quality power supply, high cost of energy, poor road transport conditions and inadequate storage facilities in the port. Suggests the development of University/Industry cooperative research programmes in food processing industry at national and regional level with the initiative of Government of India. GS

1263

Jain (A). **Prospects of fruits and vegetable processing units in Rajasthan.** *Indian Food Packer* 46(5); 1992; 93-98

Rajasthan produced 1,09,023 t. of fruits, 2,88,152 t. of vegetables and 2,80,190 t. of spices during 1990-91. Hence, a number of industrial units for the processing of fruits like mango, lemon, orange, mosambi, Kinnow, malta, guava and pomegranate, vegetables like potato, tomato, onion and brinjal, spices like cumin, fennel, fenugreek, garlic, ajowan and ginger were set up. The 135 fruit and vegetables processing industries registered with the Directorate of Industries in Rajasthan are presented district wise. The infrastructural facilities, credit facilities, good power and water availability provided by the Rajasthan government are outlined and suitable locations for further establishment of fruit and vegetable processing industrial units are mentioned. GS

1264

Thakur (S). **Development of fruit and vegetable industry in Himachal Pradesh.** *Indian Food Packer* 46(5); 1992; 99-100

Reports the installation of fruit processing industries at Jarol, Jabli, Parwanoo in Himachal Pradesh, the encouragement given to large scale units like Himprocess and Modern Foods; the growth of cider and fruit based wine industries; the preferential allotment of land for fruit-based units; government subsidy for fruit based units for installation, market promotion, participation in exhibitions, advertisement etc. GS

1265

Pandhi (DP). **Role of the state for the growth of the fruit and vegetable processing industries.** *Indian Food Packer* 46(5); 1992; 101-102

Introduction of suitable hybrid tomatoes for different processed products; the establishment of 18 community canning centres to train workers; increasing the production area of fruit crop in the 8th plan; the encouragement given to Orissa Agro Industries Corporation (OAIC) for modernisation and OAIC in turn gives encouragement to private entrepreneurs to start fruit/vegetable processing industries are some of the steps taken by the Orissa State Government for the growth of fruit and vegetable processing industries. GS

1266

Basu (CK). **Role of States in the growth of fruit and vegetable processing industries.** *Indian Food Packer* 46(5); 1992; 108-109

The steps taken by Government of India for the growth of food processing industries are liberalisation of export-import policy; simplification of procedures for industrial clearance and approvals; development of processed fruit/vegetable products like pulps, juices, dehydrated RTS beverages, pickles, preserves, chutney, sauces and concentrates; improvement of frozen fruit/vegetable industry and educating the consumers on the use of processed food. GS

1267

Mallorca (R), deLeon (SY) and Lim-Sylianca (CY). **Free glutamic acid in some Philippine fruits and vegetables.** *ASEAN Food Journal* 7(2); 1992; 108-110

The glutamic acid (mg/100 g, edible portion) contents of some fruits and vegetables of Philippine. Fruits: avocado (*Persea americana* Mill.) - 8, pineapple (*Ananas comosus* (Linn.) Merr. - 20, sugar apple (*Anona squamosa* Linn.) - 20, water melon (*Citrullus vulgaris* Schrad.) - 10. Vegetables: celery (*Apium graveolens* Linn.) - 60, fragrant screw pine (*Pandanus odoratissimus* Linn.) - 30, ginger (*Zingiber officinale* Rosc.) - 20, Horse radish tree (*Moringa oleifera* Lam.) - 200, long bean (*Vigna sinensis* Fruw) - 60, Malabar night shade (*Basella rubra* Linn.) - 309, Winged bean (*Psophocarpus tetragonolobus* Linn.) - 30. BV

## Bananas

1268

Esguerra (EB), Kawada (K) and Kitagawa (H). **Ripening behaviour of 'Senorita' bananas at different temperatures.** *ASEAN Food Journal* 7(2); 1992; 79-85

This study characterises the physiological and physico-chemical changes in ethylene-treated 'Senorita' bananas during ripening at different temp. (15, 20, 25, 30 and 35°C) and the influence of fruit quality on the ripening pattern at each temp. was assessed. Bananas held at 35 and 30°C exhibited a continuous rise in respiration upon exposure to air. Respiration rates at these temp. were highest 2 days after C<sub>2</sub>H<sub>4</sub> treatment when the fruit was at pulp colour index (PCI) 3 to 4. At 15°C, no defined respiratory climacteric was observed and ripening proceeded at a slow rate. The highest reduction in starch content both the peel and the pulp occurred at PCI2 concomitant with the increase in total and reducing sugars for all temp. evaluated. The high tannin content decreased upon ripening. Rate of ripening was more uniform at 25°C, and the peel appearance and pulp



constituents were most acceptable at this temp, but shortened the shelf-life. SRA

1269

Saca (SA) and Lozano (JE). **Explosion puffing of bananas.** *International Journal of Food Science and Technology* 27(4); 1992; 419-426

Banana slices were dehydrated by incorporating explosion puffing into the drying process. Water contents in the range 27-38%, steam temp. of 152-160°C, internal pressures of 0.8-1.0 kg cm<sup>-2</sup> and residence times of 1 min were explosion puffing conditions. Initial and final drying were performed with hot air at a temp. of 70°C, velocity 3.6 ms<sup>-1</sup> and RH 35%. The increase in porosity obtained by puffing reduced the total drying time compared with conventional air dried samples. GS

#### Carambola

1270

Sankat (CK) and Balkissoon (F). **The effect of packaging and refrigeration on the shelf life of the carambola.** *ASEAN Food Journal* 7(2); 1992; 114-117

#### Guava

1271

Chan (W-Y) and Chiang (B-H). **Production of clear guava nectar.** *International Journal of Food Science and Technology* 27(4); 1992; 435-441

Three fining methods were tested for use in producing clarified guava nectar. The enzyme hydrolysis method, especially treating the guava puree with 1000 p.p.m. of pectinase at 50°C for 3 h, accomplished satisfactory clarification but caused severe losses in volatile components, pre-treating the puree with 100 p.p.m. of pectinase for 1 h greatly facilitated the subsequent bentonite or ultrafiltration clarification processes, and both the bentonite treatment and the ultrafiltration process yielded clarified product, but the ultrafiltered product had less loss of volatiles. However, to achieve storage stability, a membrane of lower than 100000 dalton mol. wt. cut-off should be used. AA

#### Mangoes

1272

Pruthi (JS). **Simple innovations in mango processing technologies.** *Indian Food Packer* 46(5); 1992; 45-55

Describes trends in the production of 15 conventional mango products in India; newer processing technologies of mango products; technological development in unripe mango products; solar drying of green mango slices in a tent-type solar drier; exports of mango products and 'Amchur' (dried/peeled unripe mango powder) from India; technologies for newer ripe mango products; analysis of ripe mango aroma; and analysis of proximate composition of Badami mango products. GS

1273

Kumbhar (BK). **Processing of mango in the industry - A Scenario.** *Indian Food Industry* 11(6); 1992; 33-36

The paper gives the details of mango processing plants and mango processing technology as well as the various products manufactured in mango processing industries such as mango pulp, mango slices, mango beverages, jam, mango pickles and mango slices in brine. CSA

1274

Castrillo (M) and Bermudez (A). **Post-harvest ripening in wax-coated Bocado mango.** *International Journal of Food Science and Technology* 27(4); 1992; 457-463

The effect of three different concn. of two commercial wax coatings on some parameters of post-harvest ripening was evaluated. The rate of loss of fresh wt. of mangoes was reduced with both waxes at higher concn. Chlorophyll degradation of the exocarp (skin) and the increase in mesocarp (flesh) pH normally occurring during ripening was retarded at higher concn. of both wax coatings. However Primafresh 31 was less effective than Primafresh C at similar treatment concn. The results showed that the delayed ripening effects of wax-coated fruits affected fresh wt. loss, exocarp chlorophyll degradation and mesocarp pH change but did not affect mesocarp chlorophyll, sugar, and starch content. AA

#### Nectarines

1275

Lurie (S). **Controlled atmosphere storage to decrease physiological disorders in nectarines.** *International Journal of Food Science and Technology* 27(5); 1992; 507-514

'Fantasia', 'Flavortop', and 'Flamekist' nectarines were examined for their response to controlled atm. (CA) storage. All 3 cv. stored well for up to 6 weeks at 0°C in an atm. of 10% O<sub>2</sub> + 10% CO<sub>2</sub>, while some

but not all the cv. also stored well in 2% O<sub>2</sub> + 5% CO<sub>2</sub> or 10% O<sub>2</sub> + 5% CO<sub>2</sub>. The physiological storage disorders of internal breakdown and reddening were almost completely absent in nectarines kept in 10% O<sub>2</sub> + 10% CO<sub>2</sub>. When 'Flamekist' nectarines from 2 harvests were stored in 10% O<sub>2</sub> + 10% CO<sub>2</sub> atm. for 6 or 8 wks at 0°C, the fruit from the first harvest was of better quality after post-storage ripening. Although this controlled atm. prevented internal breakdown and reddening, after extended storage fruit did not develop the increased soluble solids content or extractable juice during post-storage ripening that occurred in non-stored fruit. Therefore, while preventing storage disorders, CA does not reduce the loss of ripening ability occurring during nectarines storage. AA

## Peaches

1276

Lyon (BG), Robertson (JA) and Meredith (FI). **Sensory descriptive analysis of cv. Cresthaven peaches - Maturity, ripening and storage effects.** *Journal of Food Science* 58(1); 1993; 177-181

Peaches (cv. Cresthaven), at 3 maturity grades (IM-immature, TM-threshold mature, and MA-mature), were evaluated by a trained descriptive analysis panel before and after ripening at 20°C and 85% RH and after storage at 0°C, followed by ripening. Variable Cluster Analysis indicated 4 clusters (CL) of attributes that explained > 70% of the variation in the data. CL-I (green, hardness, fracturability) distinguished IM and TM fruit at harvest. CL-II (peachy, sweet, fruity, juiciness) showed that IM ripened fruit did not attain a comparable intensity of these notes as did ripened TM or MA fruit. Intensity of flavour changes due to ripening and storage depended on maturity of fruit when it was harvested. AA

## Plums

1277

Saini (SPS) and Wani (MA). **Enzymatic clarification of plum pulp for higher concentration.** *Research and Industry, India* 38(1); 1993; 19-22

Study was conducted on the enzymatic clarification of plum pulps from Alubukhara, Santa-Rose and Satsuma cv. of plum. Juice yield obtained from hot break pulp was higher than cold extracted pulps in all the 3 plum var. Pectinolytic enzyme treatment yielded clear bright juice with thin consistency having no residual pectin. It also caused reduction in viscosity. Tintometric colour studies of RTS-drinks proved that enzymatically clarified juice from hot extracted pulps yielded better results. Overall scoring improved further when plum juices

were blended uniformly prior to the preparation of their RTS-drinks. Enzymatically clarified juices seem more suitable for higher fold of concn. due to elimination of suspended material. AA

## Strawberries

1278

d'Amour (J), Gosselin (C), Arul (J), Castaigne (F) and Willemot (C). **Gamma-radiation affects cell wall composition of strawberries.** *Journal of Food Science* 58(1); 1993; 182-185

Irradiation of strawberries at 4 kGy caused extensive tissue softening and partial degradation of cell wall polysaccharides. Cellulose and the polygalacturonic acid chains of the pectic fractions were more affected than neutral sugar side chains of the pectic and hemicellulose fractions. SRA

## CONFECTIONERY, STARCH AND SUGAR

### Sugar

1279

Banerji (RK) and Ajay (G). **A comparison of non-linear regression algorithm with various mathematical methods used to calculate first order BOD equation constants for sugar mill effluents.** *Indian Sugar* 42(8); 1992; 597-602

The values of K' and Lo first stage first order BOD kinetic constants for sugar mill effluents determined through the program for boiling house effluent are 0.13 day<sup>-1</sup> and 1048 mg/l; for mill house effluent 0.21 day<sup>-1</sup> and 1070 mg/l and for combined mill effluent 0.21 day<sup>-1</sup> and 1449 mg/l respectively. On the basis of the kinetic constants, the total time required to decompose the organic matter to discharge limit of 30 mg/l by self purification process is estimated to be 27.3, 17.0 and 18.5 days for boiling house effluent, mill house effluent and combined mill effluent respectively. SRA

### Sugarcane

1280

Patel (MS), Koria (RG) and Polara (JV). **Effect of location and varieties on sugarcane + chemical - composition and quality of juice.** *Indian Sugar* 42(7); 1992; 445-447

Field experiments conducted on sugarcane var. Co 6304, Co 6907, Co 6806, Co 6902, CoA 7602, Co 7708, Co 7804, Co 7806, CoC 671 and Co 419 in



Junagadh and Kodinar locations on calcareous clay soils, revealed that irrespective of the location, the glucose content was highest in the var. Co 419 followed by var. Co 6304 and Co 7804. Highest and lowest sucrose contents were recorded in the var. CoC 671 and Co 6304 respectively in both locations. In general, the content of N, K, Ca, S, Fe, Zn and Cu was higher by 4, 79, 64, 10, 12, 10 and 71% at Kodinar than that Junagadh. The content of P and Mg was higher by 15 and 13% under Junagadh condition than that Kodinar respectively. Var. CoC 671 is considered as most suitable for Saurashtra region of Gujarat. SRA

1281

Ahmed (R) and Khan (AQ). **A new empirical formula for estimation of sugar recovery in sugarcane.** *Indian Sugar* 42(8); 1992; 627-630

An empirical formula developed estimates sugar recovery in sugarcane on the basis of juice extraction % and lowest exhaust molasses purity. Sugar recovery % cane  $[S-(B-S) 0.32] F'$  where S and B = sucrose and brix % juice, 0.32 is a constant derived from lowest exhaust molasses purity in unit.  $F' = 2E - Z2/0.84$ .  $F'$  is the factor which represents the max. available juice per unit cane. 0.84 is the constant for max. juice recovered at 0.1 fiber per unit cane. This new formula would be most useful for estimation of sugar recovery in sugarcane var. with small cane sample and without the need for detn. of fibre % cane involving a cumbersome process. SRA

## BAKERY PRODUCTS

1282

Kamel (BS) and Stauffer (CE). **Advances in baking technology.** 1-408; 1993

Reviews recent advances in the baking industry with particular emphasis on developments in ingredients and processes. Various chapters covered include wheat and wheat flour by Bushuk, W and Scanlon, M.G. (pp 1-19); Rye flour, wholemeal breads and rye breads by Prihoda, J., Holas, J. and Kratochvil, J. (pp. 20-37); Advances in breadmaking technology by Brown, J. (pp. 38-87); Frozen dough production by Stauffer, C.E. (pp. 88-106); Dough rheology and physical testing of dough by Rasper, V.F. (pp. 107-133); Texture measurements on finished baked goods by Bourne, M.C. (pp. 134-151); Enzymes and dough improvers by Kulp, K. (pp. 152-178); Emulsifiers in baking by Kamel, B.S. and Ponte, J.G. Jr. (pp. 179-222); Lecithin and phospholipids in baked goods by Silva, R. (pp. 223-253); Sensory evaluation by Setser, C.S. (pp. 254-291); Microwave technology in baking by

Schiffmann, R.F. (pp. 292-315); Extrusion of baked products by Miller, R.C. (pp. 316-335); Fats and fat replacers by Stauffer, C.E. (pp. 336-370); Dietary fiber, analysis physiology and calorie reduction by Stauffer, C.E. (pp. 371-398). Also covers the subject index (pp. 401-408). CSA

1283

AFST(I) (Mysore). **Developments in milling and baking technology.** 1-134; 1991

Different topics covered in this volume are wheat varieties vis-a-vis end-use proportion - present Indian scenario by Hanslas, U.K. and Sangeeta Gupta (pp. 107); Storage, handling and distribution of wheat by Shivanna, C.S. (pp. 8-13); Diseases in wheat in relation to milling and baking quality by Sekhon, K.S. and Narpinder Singh (pp. 14-25); Opportunities for variety in baked products by Sullivan, J.W. (pp. 26-30); Indigenous machinery for bread production by Kale, K.B. (pp. 31-35); Trend in bread processing and Indian situation by Mithander, V.B. (pp. 36-40); Bakery fats by Chandrasekharan (pp. 41-43); Utilization of by-products of flour milling industry by Shurpalekar, S.R. (pp. 44-54); Recent advances in Chemistry of wheat proteins in relation to end-products by Sidhu, J.S., Bhupender Singh and Bajaj, M. (pp. 55-62); Wheat based traditional Indian foods by Anja, S.S. (pp. 63-68); Diversification of bakery products in small scale sector-need and possibilities by Selvarajan, G. (pp. 69-72); Baking industry - Trends and opportunities by Shaw, J.C. (pp. 73-80); Indian commercial flours and their response to additives by Menon, C.P.S. (pp. 81-87); Quality standards of bakery products - problems and perspectives by Jayaram, R. (pp. 88-91); Need for trained personnel for the production of quality milled products, by Krishnaiah, M.M. and Venkateswara Rao, G. (pp. 92-94); Preservatives for extending the shelf-life of wheat based products by Vidyasagar, K. (pp. 95-101); Problems related to Indian baking industry in small scale sector by Lawrence, J. (pp. 102-106); Bakery industry by Narayanan, P.V. (pp. 107-111); Marketing of bakery products (pp. 112-122); Problems in marketing of products of small scale bakery units by Langer, S.S. (pp. 123-127); Role of Small Industries Service Institute in promotion and modernisation of small scale bakery industry in the country by Adsule, P.G. (pp. 128-132); Bakery products as carriers of nutrition by Achaya, K.T. (pp. 133). CSA



1284

Gothwal (PP) and Bhavadasan (MK). **Studies on the browning characteristics in dairy products.** *Indian Journal of Dairy Science* 45(3); 1992; 146-151

This study reports the change in browning as estimated by pronase method during storage of khoa, condensed milk, skim-milk powder and sterilized milk. Khoa prepared from buffalo milk showed higher total solids and browning than that made from cow milk. Market samples of khoa showed wide variation in composition and browning. Generally a higher browning rates than samples prepared in laboratory was observed. The browning rate of khoa was slow during storage. Browning of condensed milk increased with storage time, temp. and viscosity. Skim-milk powder showed increase in browning and loss in available lysine on storage ( $> 30^{\circ}\text{C}$ ). Milk sweetened or unsweetened, stored in sterilized bottle, showed no appreciable change in browning. SRA

#### Milk

1285

Lawless (HT) and Claassen (MR). **Validity of descriptive and defect-oriented terminology systems for sensory analysis of fluid milk.** *Journal of Food Science* 58(1); 1993; 108-112, 112

Fluid milk defects were evaluated by 2 trained sensory panels, one generating their own associative descriptive terms (PG) and the second using traditional dairy judging terminology (TT). The same samples were evaluated by a consumer acceptance panel. The trained panels had equal levels of discriminative ability as shown by ratings of untreated, oxidized and rancid milks. The PG system had as good or better correlation with consumer acceptability ratings as the TT system, as determined by multiple regression, especially when more than one defect was present. Discriminant analysis showed that descriptive profiles obtained by either trained panel could be used to identify defects by their actual root causes, and that the classification accuracy of the descriptive panel surpassed that of the defect-oriented group. AA

1286

Herrero (MA), Atienza (J), Maquieira (A) and Puchades (R). **Flow injection spectrophotometric determination of calcium, phosphate and chloride ions in milk.** *Analyst (London)* 117 (6); 1992; 1019-1024

Flow injection procedures for the detn. of Ca, phosphate and chloride ions in milk samples are described. The reactions are based on the formation of coloured complexes and their spectrophotometric monitoring. A sample pre-treatment with acetate buffer was carried out owing to the complexity of the sample matrix. For chloride, a rapid and reliable automated procedure for direct measurement of its content in milk (using a dialyser to eliminate interferences) is also described. After optimizing the sample pre-treatment and flow injection variables, the procedures were applied to commercial milk; the results obtained agreed satisfactorily with those of the reference methods. With  $50\text{ mm}^3$  samples, a working range of 0-15 p.p.m for ca, 50-150 p.p.m for phosphate and 5-100 p.p.m for chloride is covered with a precision of better than 1.1%. The sample throughput was higher than  $50\text{ samples h}^{-1}$ . These preliminary experiments are the basis for the automation of the detn. of Ca, phosphate and chloride ions using a computer-controlled, self-designed and laboratory-built autoanalyser. AA

1287

Raats (MM) and Shepherd (R). **Free-choice profiling of milks and other products prepared with milks of different fat contents.** *Journal of Sensory Studies* 7(3); 1992; 179-203

Free-choice profiling was adopted to evaluate milks of different fat content and food products such as cornflakes, flavoured milk, instant coffee, oat cereal, savoury sauce, tea and whipped dessert prepared from them. The milks of different fat content, flavoured milk, cornflakes, savoury sauce, and tea showed significant difference from each other. While instant coffee, oat cereal and whipped desserts did not. The samples with different fat content were profiled as 'thin/watery', 'buttery/fatty/greasy/oily', 'coating/clinging' and 'creamy/rich'. SD

1288

Jung (D-S), Bodyfelt (FW) and Daeschel (MA). **Influence of fat and emulsifiers on the efficacy of nisin in inhibiting *Listeria monocytogenes* in fluid milk.** *Journal of Dairy Science* 75(2); 1992; 387-393

The recent FDA affirmation of nisin, an antimicrobial peptide, as a GRAS (generally recognized as safe) additive in pasteurized cheese spreads has renewed interest in its potential application in US dairy products. Fluid milks were prepared with varying concn. of milk fat (0 to 12.9%) and of nisin (0 to  $50\text{ }\mu\text{g/ml}$ ). Biological activity assays using a sensitive indicator microorganism in a well



diffusion system indicated that initial nisin activity (50 µ/ml) decreased by about 33% when it was added to skim milk and by more than 88% when added to milk containing 12.9% fat. Nisin activity decreased by ca. 50% in milk containing 1.29% fat. Milks containing 0, 10, or 50 µ/ml of nisin and varying fat percentages were challenged with approx. log<sub>10</sub> 7 to 7.5 cfu/ml of log phase *Listeria monocytogenes* Scott A or Jalisco. At 2 h after inoculation, the viable count of *L. monocytogenes* Scott A decreased to log<sub>10</sub> 3.0 cfu/ml in skim milk with 50 µ/ml of nisin, decreased to log<sub>10</sub> 2.90 cfu/ml in skim with 10 µ/ml of nisin, and increased slightly (log<sub>10</sub> 7.8 cfu/ml) in skim milk without nisin. In half-and-half (12.9% milk fat), nisin was far less effective in inhibiting *Listeria* with populations decreasing to log<sub>10</sub> 6.57 cfu/ml for 50 µ/ml. Similar results were obtained with *L. monocytogenes* Jalisco. The nonionic emulsifier, Tween 80, partially counteracted decreases of nisin activity in milks, whereas the anionic emulsifier, lecithin, had no effect. Addition of Tween 80 significantly increased the activity of nisin against *L. monocytogenes* in milk regardless of fat content. AA

1289

Banon (S) and Hardy (J). **A colloidal approach of milk acidification by glucono-δ-lactone.** *Journal of Dairy Science* 75(4); 1992; 935-941

Colloidal techniques (laser Doppler electrophoresis, particle size analysis, and capillary viscosimetry) were used in combination with a turbidimetric method to study milk acidification by glucono-δ-lactone. In agreement with a previous paper, micellar phenomena as a whole can be related to the turbidimetric observations, and it appears possible to hypothesize a logical development of milk acidification at the micellar level. The observed electrokinetic and hydrodynamic compartment of micelles can be explained by the presence of an outer hairy layer. Then, as for renneting, ethanol, or thermal milk treatments, the micellar destabilization by acidification could largely depend upon the collapse of this outer hairy layer. Thermal motion should be a major factor for aggregation of particles because increasing temp. leads to increasing frequency of particle encounters. Casein solubilization from low temp. and acidification seems to act as an additional micellar destabilizing factor. AA

1290

Hosoda (M), Hashimoto (H), Morita (H), Chiba (M) and Hosono (A). **Antimutagenicity of milk cultured with lactic acid bacteria against N-methyl-N'-Nitro-N-Nitrosoguanidine.** *Journal of Dairy Science* 75(4); 1992; 976-981

The antimutagenic effect of cultured milk using 71 strains of lactic acid bacteria belonging to the genus *Lactobacillus*, *Streptococcus*, *Lactococcus*, and *Bifidobacterium* on the mutagenicity of N-methyl-N'-nitro-N-nitrosoguanidine was investigated *in vitro* using *Salmonella typhimurium* TA 100 as an indicator bacterium. Each cultured milk sample displayed its characteristic antimutagenic effect on the mutagenicity of N-methyl-N'-nitro-N-nitrosoguanidine. The milk cultured with *Lactobacillus acidophilus* LA 106 (LA2) showed the highest inhibition of 77% against the mutagenicity of N-methyl-N'-nitro-N-nitrosoguanidine among the strains tested. Changes in the antimutagenic effect of the milk cultured by *Lb. acidophilus* LA 106 (LA2) during incubation were also examined using N-methyl-N'-nitro-N-nitrosoguanidine as a mutagen. AA

## Milk products

1291

Batish (VK), Grover (S) and Neelankantan (S). **Improving shelf-life and safety of fermented milk products through genetically improved microorganisms.** *Indian Dairyman* 45(2); 1993; 51-57

Bacteriocins of lactic acid bacteria are very useful in food preservation and also in the production of a variety of fermented foods such as *dahi*, *shrikhand*, *lassi*, *leben*, *yoghurt*, *cheese*, *kumiss*, *kefir* and cultured milks. The involvement of plasmid in bacteriocin production greatly facilitates the construction of newer strains capable of producing elevated levels of this food grade preservative. Molecular cloning and manipulation of genes adopted during bacteriocin production may further improve the preservative and therapeutic value of fermented foods. GS

## Cheese

1292

Singh (S) and Kanawjia (SK). **Application of biotechnology in accelerated ripening of cheese.** *Indian Dairyman* 45(2); 1993; 66-67

Application of biotechnological principles enhanced the ripening buffalo cheddar cheese. DRI-VAC cultures No. 40, 44 and 56 developed better flavour. *Lactobacillus casei* starter increased flavour. Adding cheddar curd slurries to milk accelerated flavour development. Use of microbial rennet in buffalo milk accelerated the cheese ripening. Exogenous enzymes like proteases and lipases, stimulated flavour development and enhanced glycolysis, proteolysis and lipolysis during cheese



ripening. Microencapsulated enzymes stimulated flavour development. Supplementation of buffalo milk with goat milk accelerated cheese ripening. GS

1293

Thapa (TB) and Gupta (VK). **Changes in sensoric and rheological characteristics during storage of processed cheese foods prepared with added whey protein concentrates.** *Indian Journal of Dairy Science* 45(3); 1992; 140-145

Processed cheese foods (PCF) manufactured with whey protein concentrates (WPC) at 0%, 15% and 20% levels showed faster ( $p < 0.05$ ) deterioration of flavour and appearance during storage 37°C. A shelf-life of 42 days was observed in processed cheese foods, having 20% of cheese solids replaced with those of WPC. NDRI and exp. processed cheeses exhibited significantly longer ( $p < 0.05$ ) shelf-life (77 and 78 days respectively). During storage, hardness increased, cohesiveness and springiness decreased, and adhesiveness, gumminess and chewiness showed varying trends in those products. BV

#### Cream

1294

Lee (S-Y) and Morr (CV). **Fixation staining methods for examining microstructure in whipped cream by electron microscopy.** *Journal of Food Science* 58(1); 1993; 124-127

Whipped dairy cream (WDC) specimens were prepared for examination by transmission electron microscopy (TEM) and scanning electron microscopy (SEM) by one of 3 alternative post-mordant procedures, i.e., imidazole-buffered osmium tetroxide (IBO), ferricyanide osmium tetroxide and tricomplex osmium tetroxide. These procedures utilized a tannic acid-guanidine-HCl mordant, thiocarbonylhydrazide as a bridging ligand, and a p-phenylenediamine en bloc stain treatment to improve specimen fixation and staining. TEM and SEM specimens prepared by all three procedures provided good contrast and resolution of the microstructure of WDC. The IBO method provided more uniform staining and more complete fixation and retention of lipids in milk fat globules than either of the other two methods. AA

#### Dahi

1295

Sarkar (SP), Dave (JM) and Sannabhadti (SS). **A note on the effect of thermization of misti dahi on the acid producers count.** *Indian Journal of Dairy Science* 45(3); 1992; 131-134

Thermization was introduced as the last processing step on the finished product for enhancing the shelf-life. The average per cent reduction in the cfu of the acid producers observed after thermization at 60°C for 5 min of buffalo milk *misti dahi* was 99.98, 99.41, 99.49 and 99.99 for MDC-1, MDC-2, MDC-3, MDC-4, and MDC-5, and for cow milk *misti dahi* the reduction values were observed to be 99.76, 99.37, 99.47, 99.52, and 99.59, respectively. It is seen that the reduction in acid producers count for both the type of *misti dahi* with thermization varied with the types of cultures. AA

1296

Sarkar (SP), Dave (JM) and Sannabhadti (SS). **Effect of thermization of misti dahi on shelf-life and  $\beta$ -D-galactosidase activity.** *Indian Journal of Dairy Science* 45(3); 1992; 135-139

The results indicate that though the thermization treatment has adverse influence on enzyme activity and associated nutritional benefit. The significant extension in shelf-life that could be achieved by this treatment may make it an attractive proposition for the dairy industry. *Misti dahi* based on cow and buffalo's milk, using commercial mixed starter (MDC-1) and *Streptococcus thermophilus* strains (MDC-2 and MDC-3) subjected to thermization at 60°C for 10 min produced an acceptable product with a shelf-life of 3 wks at ambient temp. (28-32°C). SRA

#### Ghee

1297

Arora (KL), Gupta (VK) and Chakraborty (BK). **Sensory qualities of curdled milk ghee vis-a-vis commercial ghee.** *Indian Journal of Dairy Science* 45(3); 1992; 157-158

Curdled milk ghee was comparable in all sensory characteristics to the commercial ghee. Curdled milk ghee showed significantly ( $p$  less than or equal to 0.05) more appealing flavour (score: 55.0-56.13) than fresh milk ghee (score: 52.83). The texture of curdled milk ghee was comparable with that of fresh and 0.5% T.A. milk ghee, but was significantly ( $p$  less than or equal to 0.05) inferior (score: 21.67-21.83) to that of NDRI ghee (score: 23.17). Results suggest that sour curdled milk can be effectively utilized for ghee manufacture through direct churning method with the view of optimum fast recovery, physico-chemical and sensory characteristics, shelf-life and safety aspects. SRA



## Ice creams

1298

Kishi (M), Ugajin (I), Masuda (Y) and Uzawa (M). **Free amino acids of commercial vanilla ice creams and their materials.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 38(9); 1991; 811-816

Free amino acids (FAA) of commercial vanilla ice creams and their materials, dairy products and egg yolk, were determined by an amino acid analyzer. (1) The total FAA content of 11 samples of vanilla ice creams was from 94 to 388  $\mu\text{g/g}$ . Among FAA of ice creams, the major components were glutamic acid, taurine and phosphoethanolamine. (2) The ice creams were classified based on a price per volume into four groups; super premium type ice cream (SPI), premium type ice cream (PI), normal type ice cream (NI) and rakuto-aisu (RA) in order of price. The averages of total FAA of SPI, PI, NI and RA were 297, 191, 147 and 96  $\mu\text{g/g}$ . The difference in the composition of FAA between SPI and the other groups seemed to be caused by the use of egg yolk. (3) The total FAA contents of fresh cream, butter, evaporated skim milk, skim milk powder and egg yolk were 65, 42, 470, 1196 and 4697  $\mu\text{g/g}$ . The heat treatments on fresh cream, evaporated skim milk and skim milk powder during the process of manufacture were different, but their total FAA contents in micrograms per gram of non-fat milk solid were nearly the same. And also, their compositions of FAA were nearly the same. The compositions of FAA of ice creams except SPI were similar to those of dairy products. AA

## Khoa

1299

Goyal (GK). **Changes in the oxygen transmission rate of flexible packages during storage of khoa.** *Indian Journal of Dairy Science* 45(3); 1992; 127-130

## Milk proteins

1300

Yost (RA) and Kinsella (JE). **Properties of acidic whey protein gels containing emulsified butterfat.** *Journal of Food Science* 58(1); 1993; 158-163

Changes in physical properties of whey protein gels following addition of emulsified fat were investigated. Gels were made by heating mixtures of dialysed whey protein isolate (DWPI) at pH 4.60 with and without emulsified fat droplets. At higher DWPI concn. (10.50%) and fat concn. (0.00-30.00%) gels were very firm. A mean fat droplet size of 1.85

$\mu\text{m}$  reinforced gel strength. Gels of 6.78% DWPI were the most responsive to reinforcement by emulsified butter fat. The elastic moduli and viscosities of whey protein gels at pH 4.60 increased with fat content, whereas syneresis decreased upon addition of fat. SRA

1301

Mahmoud (R) and Savello (PA). **Mechanical properties of and water vapour transferability through whey protein films.** *Journal of Dairy Science* 75(4); 1992; 942-946

Transglutaminase was used to produce films by polymerization of whey proteins. The reaction mixture consisted of 5% whey protein in pH 7.5 buffered solution under reducing conditions in the presence of  $\text{Ca}^{2+}$  ions and glycerol. The water vapour transferability and the percentage of moisture of films were not significantly influenced by the whey protein fraction. Water vapour transferability was inversely related to film thickness. Glycerol concn. of films directly affected film resistance to breakage, moisture content, and resistance to water vapour transferability. AA

1302

Mistry (VV) and Hassan (HN). **Manufacture of nonfat yoghurt from a high milk protein powder.** *Journal of Dairy Science* 75(4); 1992; 947-957

Nonfat yoghurts were manufactured from skim milk fortified with a new high milk protein powder. The powder, containing approx. 84% milk protein, was added to skim milk to obtain 5.2 to 11.3% total protein, 11.1 to 15% total solids, and 1.6 to 7.9% lactose in the yoghurt mix. Mixes were homogenized, pasteurized at 90°C for 10 min, and fermented with a yoghurt culture at 42°C to pH 4.6. Controls were made from the same skim milk fortified with NDM to approx. 14% total solids. Yoghurts made with the protein powder and containing 5.6% protein were similar in firmness to the control and had good flavour when fresh and after 2 wk of storage. Yoghurts with more than 5.6% protein were too firm and had an astringent flavor. Acetaldehyde content of all yoghurts was comparable with that of the control, and fat content ranged from .18 to .33%. As the protein content of yoghurts increased, the porosity of yoghurts, as seen by scanning electron microscopy, decreased. Good quality nonfat yoghurts can be produced supplementing skim milk with a high milk protein powder up to 5.6% protein. The added protein assists in providing a firm body and minimal whey separation without the use of stabilizers. AA

## Meat

1303

Petersen (A). **N-Nitrosodibutylamine and other volatile nitrosamines in cured meat packaged in rubber nettings.** *Journal of Food Science* 58(1); 1993; 47-48

Results of the two investigations (conducted at Denmark, USA and Canada) of N-nitrosodibutylamine (NDBA) in cured meat are compared. At Denmark small amounts of NDBA were found in the cured meat packaged in elastic rubber nettings. This was very unlike the results from investigations in the USA and Canada. Cured meats packaged in plastic wrappings or cotton nettings did not contain any NDBA. SRA

1304

Miyazawa (T), Kashima (M) and Fujimoto (K). **Fluorometric peroxygenase assay for lipid hydroperoxides in meats and fish.** *Journal of Food Science* 58(1); 1993; 66-70

A fluorometric assay for lipid hydroperoxide in meats and fish was developed using pea peroxygenase, a hydroperoxide-dependent hydroxylase. The freeze-dried microsome fraction of germinating pea seed was used as a peroxygenase source. Linear relationships between the hydroperoxide added (25 to 150 nmol) and fluorescence were observed with methyl linoleate hydroperoxide, linoleic acid hydroperoxide, triglyceride hydroperoxide, and phosphatidylcholine hydroperoxide.  $\alpha$ -Tocopherol at levels equivalent to those in meats and fish did not affect the peroxygenase reaction. The assay was specific for hydroperoxides. The method enables detn. of total lipid hydroperoxides in sample homogenates without extracting total lipids from retail meats and fish. AA

## Beef

1305

Ellekjaer (MR). **Assessment of maximum cooking temperatures of previously heat treated beef. Part 2. Different scanning calorimetry.** *Journal of the Science of Food and Agriculture* 60(2); 1992; 255-261

Differential scanning calorimetry (DSC) was studied as a potential method for the detn. of the previous heat treatment of beef. Samples of beef (*M. longissimus dorsi*) from eight bulls were heat treated

at nine different temp. between 50 and 85°C and subsequently analysed by DSC. The DSC method was able to determine the previous heat treatment temp. of the beef samples with a prediction error of 0.6°C in the temp. range 50-72°C, when multivariate analysis of the full DSC-thermograms was used. This indicates that DSC has potential applicability as a regulatory method to assess the max. cooking temp. of previously heat treated beef. AA

1306

Chan (KM), Decker (EA) and Means (WJ). **Extraction and activity of carnosine, a naturally occurring antioxidant in beef muscle.** *Journal of Food Science* 58(1); 1993; 1-4

Several methods were tested to produce a carnosine-containing antioxidant extract from beef muscle (BM). Removal of prooxidants (iron- and heme-) containing compounds by 100°C heat treatment or ultrafiltration increased antioxidant activity (AA) of BM extract. Freeze-drying had little effect on the AA of treated extracts, but vacuum oven drying increased the AA. Demineralized vacuum oven-dried 100°C heated extract had the greatest AA at low carnosine concn. However, > 85% inhibition of lipid oxidation was obtained with freeze-dried (30 mM) and vacuum oven-dried (> mM) UF permeate and vacuum oven-dried 100°C heated extract (> 10 mM). SRA

1307

Cooksey (K), Klein (BP) and McKeith (FK). **Heating and texture profiles of packaged pasteurized beef loin steaks from precooked roasts.** *Journal of Food Science* 58(1); 1993; 5-8, 20

Heating and cooling profiles for precooked beef loin steaks to 60, 70 and 80°C internal end point temp. When pasteurized in a water bath set at 65, 85, and 100°C was determined and the effect of the end point temp. and pasteurization water temp. on the physical and textural characteristics of the meat were examined. Steaks heated to internal temp. close to the cooking water temp. had the least differences in temp. between layers. Total cooking losses increased ( $p < 0.05$ ) as internal end point temp. and pasteurization water temp. increased. Texture profiles of steaks cut from precooked roasts were similar to pasteurized steaks. SRA

1308

Park (J), Rhee (KS), Kim (BK) and Rhee (KC). **Single-screw extrusion of defatted soy flour, corn starch and raw beef blends.** *Journal of Food Science* 58(1); 1993; 9-20



Effects of feed moisture, fat and corn starch levels and process temp. on physical properties of extrudates of defatted soy flour-amylose corn starch-raw beef blends were investigated using response surface methodology. Feed moisture (X1) linearly affected shear-force (SF), water absorption (WA), and quadratically affected expansion ratio (ER), bulk density (BD) and SF; feed fat (X2) had a linear effect on ER and BD; corn starch (X3) had a linear relationship with ER, BD and SF and a quadratic relationship with BD and SF; process temp. (X4) had a linear effect on BD, hunter colour (HCL) and WA and a quadratic effect on ER and SF; the two-factor interactions found to be significant were X2, X3 for HC(L) and WA and X1, X4 for HC(L). The optimum extrusion conditions for minimal SF values with 20% non-dehydrated beef muscle and varied amounts of defatted soy flour, were 29.1% feed moisture; 2.96% feed fat; 22% feed corn starch; and 162°C process temp. SRA

1309

Park (J), Rhee (KS), Kim (BK) and Rhee (KC). **High-protein texturized products of defatted soy flour, corn starch and beef: Shelf-life, physical and sensory properties.** *Journal of Food Science* 58(1); 1993; 21-27

Selected mixes consisting of Bf [high-beef (29%), low-fat (2.96%)], bf [low-beef (20%) low-fat] and BF [high-beef high-fat (5%)] which incorporated raw beef, defatted soy flour, and corn starch were extruded in a single-screw extruder. The products had no flavour additives and trained sensory panelists detected hay-like, beany or grainy flavours. Bf extrudate was more expanded than BF extrudate and rated least hard by the sensory panel, whereas bf extrudate was least susceptible to lipid oxidation. Bf and bf extrudates showed microstructures with large air cells. All three showed advantages of beef and soy flour in amino acid and fatty acid compositions, respectively, and were microbiologically safe during prolonged storage at 37°C. AA

1310

Arnold (RN), Scheller (KK), Arp (SC), Williams (SN) and Schaefer (DM). **Dietary  $\alpha$ -tocopheryl acetate enhances beef quality in Holstein and beef breed steers.** *Journal of Food Science* 58(1); 1993; 28-33

1311

Berry (BW). **Fat level and freezing temperature affect sensory, shear, cooking and compositional properties of ground beef patties.** *Journal of Food Science* 58(1); 1993; 34-37, 42

The effects of two fat levels (6, 20%) and two freezing temp. (-43, -20°C) on sensory, shear, cooking and

compositional properties of beef patties were studied. The 20% fat formulation increased beef flavour and initial tenderness (-20°C frozen patties) scores, but had higher shear values compared to 6% beef fat patties. Patties with 6% fat, freezing at -43°C improved sensory and tenderness. Faster freezing reduced fat retention of 20% fat patties during cooking. Use of select grade round muscles in combination with a 5-6 min cooking to a medium degree of doneness permitted an acceptable level of palatability. SRA

1312

Dickson (JS). **Contamination of beef tissue surfaces by artificially inoculated low-moisture menstrea.** *Journal of Food Safety* 12(3); 1992; 181-190

*Salmonella typhimurium* was inoculated into prepared dirt (moisture content 8.8%), sand (moisture content 0.06%) and phosphate buffer, and these menstrea were used to contaminate beef tissue. Fewer bacteria adhered to the tissue surface from the low moisture menstrea when compared to contamination by buffer. Detn. of  $S_R$  values, an estimate of the total population associated with the surface which was physically attached, indicated that more bacteria remained in the soil menstrea than adhered to the surface, when compared to buffer and sand menstrea. Contrary to expectations, bacteria which contaminated the surface from the low moisture menstrea were not more sensitive to organic acids than those which originated from the buffer. AA

1313

Anderson (ME), Marshall (RT) and Dickson (JS). **Estimating depths of bacterial penetration into post-rigor carcass tissue during washing.** *Journal of Food Safety* 12(3); 1992; 191-198

A method for predicting the depth of penetration of bacteria into various beef tissues was developed. Blue Lake, an insoluble dye, was used to simulate bacteria on the meat surface because movement of the Blue Lake into the meat tissue during spray washing could be easily visualized. The beef tissue surfaces studied were: (1) exterior lean, (2) exterior fat, (3) interior body cavity (peritoneum) and (4) cut tissue. The model indicated that many bacteria not removed during washing are driven into the beef tissue by the washing process. Interior body cavity tissue was most resistant to penetration followed by exterior lean and fat tissues, which were about equal in resistance. Cut surfaces were the most susceptible to Blue Lake penetration. AA



1314

Bonnet (M), Ouali (A) and Kopp (J). **Beef muscle osmotic pressure as assessed by differential scanning calorimetry (DSC).** *International Journal of Food Science and Technology* 27(4); 1992; 399-408

A differential scanning calorimetry (DSC) method was developed to estimate the physiological osmotic pressure of intact bovine muscle and post-mortem variation during the conversion of muscle into meat. DSC method was more practical and reliable than the freezing point osmometric method and the soaking method. GS

## Pork

1315

Ghorpade (VM) and Cornforth (DP). **Spectra of pigments responsible for pink colour in pork roasts cooked to 65 or 82°C.** *Journal of Food Science* 58(1); 1993; 51-52, 89

Undenatured oxymyoglobin and deoxymyoglobin were the pigments responsible for pink colour in pork roasts cooked to 65°C. Roasts cooked to 82°C had gray internal colour after cooking, but panelists noted development of pink internal colour after refrigerated storage. Reflectance spectra of pink slices from roasts cooked to 82°C, then stored for 12 days at 2°C, were characteristic of denatured globin hemochromes or related non-nitrosyl hemochromes. AA

1316

Garcia Zepeda (CM), Kastner (CL), Kropf (DH), Hunt (MC), Kenney (PB), Schwenke (JR), Schleusener (DS). **Utilization of surimi-like products from pork with sex-odour in restructured, precooked pork roast.** *Journal of Food Science* 58(1); 1993; 53-58, 83

Surimi-like materials from boar and sow muscle and Alaskan pollack fish surimi were evaluated as binders for sow muscle chunks in restructured roasts. Boar surimi-like material tended to have lower microbial counts and less lipid oxidation than unwashed counterparts. Increasing salt content increased lipid oxidation ( $P < 0.05$ ), degraded colour and improved ( $P < 0.05$ ) textural integrity. The surimi-like boar material had equal or better binding properties than fish surimi at a 5% level and did not consistently result in detectable boar odour. Roasts without binder were comparable or better in textural and microbial characteristics than those with binders. Restructured, precooked, pork roasts were successfully produced with 0.2% NaCl. AA

1317

Scholtz (E), Kruger (J), Nortje (G) and Naude (R). **Centralized bulk pre-packaging of pork retail cuts.** *International Journal of Food Science and Technology* 27(4); 1992; 391-398

The performance of a commercial bulk pre-packaging system was compared to a laboratory system in terms of quality attributes such as microbiology, colour, odour, and acceptability of PVC-overwrapped pork retail cuts. A similar retail shelf-life of 3 days was achieved after either 0, 7, or 14 days bulk storage with both packaging systems. The colour of the samples from both system was pale to normal during the trial. After 14 days storage the samples from both systems were still acceptable and had a fresh meat odour. The results show that the commercial system (Cryovac GFII, Darex Africa (Pty) Ltd., Kemptonpark RSA) may be applied successfully for 100% CO<sub>2</sub> bulk packaging of PVC-overwrapped pork retail cuts. AA

## Rabbits

1318

Sundaram (RNS) and Bhattacharyya (AR). **Performance of exotic meat rabbit under tropical coastal climatic condition.** *Indian Journal of Animal Research* 26(2); 1992; 109-110

Out of 4 meat type exotic breeds (Soviet Chinchilla, New Zealand White, Grey Giant and White Giant) of rabbit introduced under the coastal climatic condition (Goa), production performance of Soviet Chinchilla was better with highest kindling (78.5%), litter size (6) and av. daily wt. gain (19.17 g). The result is indicative that the meat type rabbits, particularly, Soviet Chinchilla can be successfully reared for quality meat production. AA

## Products

1319

Singh (H), Guerrero (A) and Kreimers (W). **Nonane as a radiolytic product in irradiated bacon.** *Journal of Food Science* 58(1); 1993; 49-50

Formation of nonane in irradiated bacon has been confirmed by GC/MS analysis of irradiated nitrogen-flushed homogenized bacon in sealed glass vials. Unirradiated bacon did not show the presence of nonane under similar conditions. AA

1320

Kondyli (E), Demertzis (PG) and Kontominas (MG). **Migration of dioctylphthalate and dioctyladipate plasticizers from food-grade PVC films into**



**ground-meat products.** *Food Chemistry* 45(3); 1992; 163-168

Ground-meat of varying fat contents at 4°C and -20°C was studied for the presence of dioctylphthalate (DoP) and dioctyladipate (DoA) plasticizer migrated from PVC films. After the extraction and saponification, the alcoholic constituent of the ester plasticizer was quantified by GC. The migrated amount ranged from 2-80 mg/kg of meat (0.12-4.8 mg/dm<sup>2</sup>) after 8 days at 4°C and from 2-60 mg (0.13-4 mg/dm<sup>2</sup>) after 2 1/2 months at -20°C. The amount of migrating DoA was higher than the DoP and the migration was lower to low fat samples. The rate determining step in the migration process of both DoA and DoP is that of the diffusion of the plasticizer from the bulk of the PVC film to its surface. SD

1321

Aranda (M), Trivino (I), Osorio (A), Bastias (JM) and Roos (O). **Mutagenicity of N-nitroso compounds in Chilean ham and sausages.** *International Journal of Food Science and Technology* 27(4); 1992; 385-390

Chilean hams and sausages were analysed for the presence of nitrosodimethylamine and nitrosodiethylamine by GLC/NPD. The presence of 3.5-210 p.p.b levels were found in 51.6% of the samples. All of the positive samples contained nitrosodimethylamine while only 11% of them contained nitrosodiethylamine. Mutagenicity assays were performed in *Salmonella typhimurium*. Strains TA 98 and TA 100 were used in absence and presence of S9 mix. A dose-response curve of the mutagenic activity was observed in TA 100 with S9 mix. Unscheduled DNA synthesis assay also confirmed that the purified extracts of hams and sausages at doses as low as 1 p.p.b are inducers of damage to DNA of human foetal lung cells. AA

## Frankfurters

1322

Martin (JW) and Rogers (RW). **Cure levels, processing methods and meat source effects on low-fat frankfurters.** *Journal of Food Science* 58(1); 1993; 59-61

1323

Fiddler (W), Pensabene (JW), Gates (RA), Hale (M), Jahncke (M), Babbitt (JK). **Alaska Pollock (*Theragra chalcogramma*) mince and surimi as partial meat substitutes in frankfurters: N-Nitrosodimethylamine formation.** *Journal of Food Science* 58(1); 1993; 62-65, 70

## Poultry

1324

Sachdev (AK), Verma (SS) and Ram Gopal. **Scope of biotechnology in poultry processing.** *Poultry Guide* 30(3); 1993; 50-51

Emphasizes the need to standardize cost and time effective technology to produce biosecured meat and to make effective use of poultry byproducts; suggests methods for extraction of proteins from livestock wastes; and reviews biotechniques in extending the shelf-life of meat and processing of poultry slaughter wastes for animal feeds. 17 references. GS

1325

Kondaiah (N) and Panda (B). **Processing and utilization of spent hens.** *World's Poultry Science Journal* 48(3); 1992; 255-268

Review covers information on various aspects of spent hen processing and utilization. Aspects considered include: handling, transportation and slaughter, yields of carcass components, hot processing, mechanically deboned meat, tenderization methods, physicochemical characteristics, utilization (chicken sausages and patties). BV

## Chickens

1326

Xiong (YL) and Blanchard (SP). **Viscoelastic properties of myofibrillar protein-polysaccharide composite gels.** *Journal of Food Science* 58(1); 1993; 164-167

The effect of polysaccharide gums on thermal gelation of chicken salt-soluble protein (SSP) was studied by determining changes in viscoelasticity. In a typical ionic environment for meat processing (0.6 M NaCl, pH 6.0), xanthan gum and sodium alginate at the 0.5% level improved WHC of SSP gel but hindered SSP gel structure formation and decreased gel strength. Gums at > 0.5% markedly reduced gelling ability of SSP and did not further increase water binding. Therefore, neither xanthan gum nor sodium alginate at > 0.5% is recommended for use as a texture modifier in processed meat production. SRA

1327

Dodd (NJF), Haishun (J), Lea (JS) and Swallow (AJ). **Factors influencing the yield of free radicals in irradiated chicken bones.** *International Journal of Food Science and Technology* 27(4); 1992; 371-383

The yield of free radicals in irradiated chicken bones was influenced by the nature of the bone, temp. of irradiation and gaseous atm. The dose rate, water content and type of radiation did not influence the yield of radicals. Cooking before irradiation increases the yield of radicals, whereas cooking after irradiation does not cause any change. GS

## Broilers

1328

Bajwa (IS), Singh (B), Dhir (DS) and Trehan (PK). **Effect of plumage colour on body-weight, abdominal fat and other carcass characters in broilers.** *Indian Journal of Animal Research* 26(2); 1992; 61-66

The effect of plumage colours on 6 wk. live-wt. and dressed carcass characters of broilers were studied on two populations PB-1, a growth selected line and PB-4, a random bred control. Plumage colour had significant effect on live wt. at 6 wk. Birds with various plumage colour did not differ significantly for dressed carcass yield, wt. of giblets and abdominal fat contents when expressed as % of live wt. The proportional abdominal fat content was significantly higher in growth selected line PB-1. Female birds of both the populations had higher abdominal fat than their male counterparts ( $P < 0.05$ ). AA

1329

Ajuyah (AO), Ahn (DU), Hardin (RT) and Sim (JS). **Dietary antioxidants and storage affect chemical characteristics of  $\omega$ -3-fatty acid enriched broiler chicken meats.** *Journal of Food Science* 58(1); 1993; 43-46,61

The influence of feeding full-fat flax seed with and without dietary antioxidants to 6-wk old male Hubbard chickens, on chemical characteristics of cooked white and dark meats was assessed. Level of dietary  $\omega$ -3 fatty acid and dietary antioxidant significantly influenced the  $\omega$ -3 PUFA compositions of meat lipids. Addition of antioxidants, especially mixed tocopherol plus canthaxanthin, to the diet significantly reduced concn. of malonaldehyde and total volatiles in the enriched meat, particularly dark meat. Broiler meats enriched with  $\omega$ -3 fatty acids could be stabilized by incorporation of natural antioxidants. AA

## Products

### Eggs

1330

Hsieh (YL), Regenstein (JM) and Anandha Rao (M). **Gel point of whey and egg proteins using dynamic rheological data.** *Journal of Food Science* 58(1); 1993; 116-119

The gel point temp. of coagulation type proteins and gelation type proteins were determined by extrapolating the rapidly rising phase of the storage modulus  $G'$  back to the temp. axis. The gelation onset temp. of the concn.-dependent proteins ovalbumin, ovotransferrin, and BSA were 81°C, 62°C, and 75°C, respectively. Gelation of whey protein isolate and egg white gels, both concn.-dependent, was presumably due to disulphide bonds formed by the interactions of the concn.-independent proteins;  $\alpha$ -lactalbumin and  $\beta$ -lactoglobulin, and ovalbumin and ovotransferrin, respectively. Moreover, the incipient gel temp. of whey proteins decreased when the concn. of whey proteins increased. AA

### Egg powder

1331

Lebovics (VK) and Gaal (O). **Cholesterol oxides in  $\gamma$ -irradiated spray-dried egg powder.** *Journal of the Science of Food and Agriculture* 60(2); 1992; 251-254

Thin-layer chromatography was used to follow up the chemical changes of cholesterol in spray-dried egg powder  $\gamma$ -irradiated under aerobic conditions with doses intended to eliminate *Salmonella* contamination. Chemical changes induced in cholesterol in egg powder ionising radiation proved to be similar in nature to those known to occur during autoxidation. Formation of 7-hydroxy-cholesterol isomers ( $\alpha$  and  $\beta$ ) could be observed even at 1 and 2 kGy. Doses of 4 and 6 kGy increased the quantity of these products and resulted in the appearance of cholesterol-5, 6-epoxide. At 6 kGy 7-keto-cholesterol was also identified. Non-irradiated egg powder stored for 1 month contained approx. the same quantity of 7-hydroxycholesterols as a freshly produced egg powder irradiated at 1 kGy; freshly produced egg powder irradiated at 6 kGy corresponded to 3-month-old egg powder. AA

### Egg white

1332

Hsieh (YL) and Regenstein (JM). **Failure deformation and stress relaxation of heated egg white gels.** *Journal of Food Science* 58(1); 1993; 113-115, 123

Stress-strain relationships were determined for heated egg white gels. Compressive strain at failure



was independent of protein concn., while stress at failure increased with protein concn. Between the length ratios of 1.6 and 2.4 before and after compression, the heated egg white gels followed the Mooney Rivlin model. In stress relaxation, the asymptotic hypothetical equilibrium modulus increased with protein concn. AA

## SEAFOODS

1333

Joy (CPH). **An economic and efficient method for treatment of effluent water from seafood processing plants.** *Seafood Export Journal* 25(1); 1993; 50-52

This article covers nature of effluents from seafood processing plants, effluent water parameters (biochemical oxygen demand, suspended solids, oil and grease), treatment of effluents (total utilization; separation, physical-chemical treatment; chemical oxidation; air floatation; biological treatment; activated sludge treatment; high-rate trickling filter; ponds and lagoons and land disposal methods) and details of tangential screen model (character of effluent water, method of discharge of residue). BV

## Crabs

1334

Lee (E), Meyers (SP) and Godber (JS). **Minced meat crabcake from blue crab processing by-products - Development and sensory evaluation.** *Journal of Food Science* 58(1); 1993; 99-103

## Shrimps

1335

Kantt (CA), Bouzas (J), Dondero (M) and Torres (JA). **Glucose oxidase/catalase solution for on-board control of shrimp microbial spoilage: Model studies.** *Journal of Food Science* 58(1); 1993; 104-107

An enzymatic method for on-board preservation of shrimp was examined in a model system. Holding shrimp in a glucose-GOX/CAT sol. inhibited growth of *Pseudomonas fluorescens* in the sol. and caused a lag phase of approx. 5 days in the shrimp. After 14 days storage, *Ps. fluorescens* counts had increased < 2 log cycles, while the control increased 4 log cycles. This demonstrated the potential of storing shrimp in a glucose oxidase sol. as a preservation method. Fishing vessels with refrigerated sea water systems could benefit from such longer storage times. SRA

## Fish

1336

Reppond (KD) and Babbitt (JK). **Protease inhibitors affect physical properties of arrowtooth flounder and walleye pollock surimi.** *Journal of Food Science* 58(1); 1993; 96-98

The effects of protease inhibitors from potato, bovine plasma and egg white on the punch, torsion and colour tests of arrowtooth flounder and pollock surimi were determined. At 2% addition, the inhibitors increased the strength of arrowtooth gels while variable results were found with pollock gels. Bovine plasma produced a gel with a yellow hue while the gel with potato inhibitor was darkest. AA

1337

Suparno and Poernomo (A). **Fish waste utilisation in Indonesia.** *ASEAN Food Journal* 7(2); 1992; 67-72

This paper outlines some of the studies and present status of fish waste utilisation in Indonesia. Shrimp waste, frog waste, fresh water fish waste, shrimp trawl by-catch or trash fish, fish gut, shark and problems of fish waste utilisation are the aspects included. SRA

## Albacore

1338

Medina (I), Aubourg (S), Gallardo (JM) and Perez-Martin (R). **Comparison of six methylation methods for analysis of the fatty acid composition of albacore lipid.** *International Journal of Food Science and Technology* 27(5); 1992; 597-601

Six methods widely used to produce methyl esters for the GC detn. of the fatty acid composition of a marine lipid were compared. Four acid-catalyzed methods (1%  $\text{H}_2\text{SO}_4:\text{CH}_3\text{OH}$ ; 5%  $\text{HCl}:\text{CH}_3\text{OH}$ ; 7% and 14%  $\text{BF}_3:\text{CH}_3\text{CH}$ ) and two base-catalyzed methods [ 0.5 M  $\text{NaOCH}_3:\text{CH}_3\text{OH}$ ; (1:4) tetramethylguanidine: $\text{CH}_3\text{OH}$ ] were used. The use of  $\text{BF}_3:\text{CH}_3\text{OH}$  (7% and 14%) gave a lower content of 18:1 n<sub>9</sub> than the other methods and produced an artefact (2.7-3.2% of total fatty acid content) eluting between the 20:5 and 24:1 fatty acid methyl esters. No significant differences were obtained between the other four methods. Accordingly the use of  $\text{BF}_3:\text{CH}_3\text{OH}$  for transmethylation of marine lipids is not recommended. Results obtained in the other 4 methods showed that all are comparable. AA

## Catfish

1339

Eun (J-B), Hearnberger (JO) and Kim (JM). **Antioxidants, activators and inhibitors affect the enzymic lipid peroxidation system of catfish muscle microsomes.** *Journal of Food Science* 58(1); 1993; 71-74

Various promoters and inhibitors of enzymic lipid peroxidation in catfish were investigated. At 100 p.p.m. BHA, BHT, nordihydroguaiaretic acid, TBHQ, propyl gallate, EDTA, sodium tripolyphosphate, diethylene triamine pentaacetic acid, trihydroxybutyrophene, and ethoxyquin completely inhibited lipid peroxidation activity. Natural antioxidants,  $\alpha$ -tocopherol,  $\beta$ -carotene, and rosemary powder, had moderate inhibitory effects. Sodium ascorbate and erythorbate at a concn. of 100 p.p.m. activated lipid peroxidation; however, higher concn. of these antioxidants had inhibitory effects. Unlike ferric and ferrous ions,  $\text{Cu}^{++}$  ions at 0.015 mM did not catalyze lipid peroxidation. Inorganic pyrophosphate and phosphate at 0.1 mM chelated ferric ion and inhibited lipid peroxidation. AA

1340

Thed (ST), Erickson (MC) and Shewfelt (RL). **Ascorbate absorption by live channel catfish as a function of ascorbate concentration, pH and duration of exposure.** *Journal of Food Science* 58(1); 1993; 75-78

1341

Erickson (MC). **Lipid extraction from channel catfish muscle: Comparison of solvent systems.** *Journal of Food Science* 58(1); 1993; 84-89

During extraction of lipids from catfish minced muscle using 9 solvent systems phospholipid and triacylglycerol recoveries were similar when tissue was mixed on a vortex (under nitrogen) with about 20 vol of chloroform:methanol (2:1), hexane:isopropanol (3:2), chloroform:isopropanol (7:11), dichloromethane:methanol (2:1) or chloroform:methanol:water (2:2:1). Only a few min were required to extract a tissue sample by these methods as compared to a few h for a Soxhlet extraction (petroleum ether) or for extraction by a dry column procedure (dichloromethane:methanol, 9:1). The time available for interaction of the muscle tissue with the dichloromethane:methanol (9:1) system was critical in extraction of lipids, particularly phospholipids. AA

## Hake

1342

Mendez (E), Fernandez (M), Pazo (G) and Grompone (MA). **Hake roe lipids.** *Food Chemistry* 45(3); 1992; 179-181

Raw Southwest Atlantic hake (*Merluccius hubbsi*) roe was high in lipid (6.6% dry wt. basis), and the major lipids were waxes 27.6% triacylglycerols 42.0%, cholesterol 5.7% and phospholipids 14.0%. Cooking roes in water did not change them significantly. The free fatty acid composition was 45% of polyunsaturated fatty acids (PUFA) and characteristics of manne oils. Hake roes constitute a rich source of PUFA, and therefore a valid alternative for normal diets. SD

## Mackerels

1343

Hwang (KT) and Regenstein (JM). **Characteristics of mackerel mince lipid hydrolysis.** *Journal of Food Science* 58(1); 1993; 79-83

The lipid hydrolysis products in minced mackerel stored under vacuum at 2-3°C for 15 days were free fatty acids (FFA) and 1,2-diglycerides (DG); no 1,3-DG or monoglycerides were observed. Lysophosphatidylcholine (LPC) and lysophosphatidylethanolamine (LPE) increased and then decreased with time. Lysophosphatidylserine was not observed. More FFA, 1,2-DG, LPC, and LPE were detected in dark muscle than in light muscle. The initial fatty acid composition, by GC, showed no significant differences ( $\alpha$ -0.05) among whole, light and dark muscles. When the lipid extracts were separated into 3 fractions (1: mostly triglycerides; 2: mostly FFA, DG, and cholesterol; and 3: mostly phospholipid), the degree of unsaturation of the lipids in fraction 2 was between those in fraction 1 and 3 and increased with time. These findings support the possibility that fish lipid hydrolysis may affect fish wholesomeness. AA

## Salmon

1344

Porter (PJ), Kramer (DE) and Kennish (JM). **Lipid composition of light and dark flesh from sockeye salmon.** *International Journal of Food Science and Technology* 27(4); 1992; 365-369

The dark flesh of sockeye salmon (*Oncorhynchus nerka*) contains over 8 times more lipid than does light flesh, and has a greater proportion of triglycerides and monounsaturated fatty acids. The predominant phospholipid in the light flesh is phosphatidylcholine and in dark flesh it is phosphatidylethanolamine. Both light and dark



flesh are rich sources of the nutritionally important  $\omega$ -3 fatty acids. BV

### Smooth oreo dory

1345

Scott (DN), Fletcher (GC), Charles (JC) and Wong (RJ). **Spoilage changes in the deep water fish, smooth oreo dory during storage in ice.** *International Journal of Food Science and Technology* 27(5); 1992; 577-587

Smooth oreo dory (*Pseudocyttus maculatus*), a deep water fish, was monitored for changes during storage in ice. Based on the sensory evaluation of the cooked flesh the storage life was 8 days for acceptable quality fish. Bacterial counts of flesh and surface, the loss of inosine monophosphate (IMP) and the K value showed significant changes during the storage life. Therefore these were found to be useful for monitoring loss of freshness and development of spoilage. After 13 days there were off flavours in the cooked fish, dephosphorylation of IMP had levelled off, and the K value had reached 70%. The changes that occurred during storage of this deep water species in ice were similar to those changes commonly observed in demersal species from shallow temperate coastal waters. AA

### Snapper

1346

Prescott (J) and Bell (JD). **Sensory evaluation of Australian snapper (*Pagrus auratus*) raised in captivity.** *ASEAN Food Journal* 7(2); 1992; 111-113

This paper reports the sensory evaluation of 3 groups of snapper: wild fish, snapper fed on a pelleted diet based on fish meal, and those raised on fish flesh. The mean rating for flavour, colour of fish and fresh taste exceeded 50 for each type of fish, whereas the rating for presence of off flavour was low for all three types of fish. The rating for flavour was  $-F_{2,58} = 2.94$ ,  $P = 0.061$ , colour of flesh  $-F_{2,58} = 2.89$ ,  $P = 0.064$ , fresh taste  $-F_{2,58} = 1.78$ ,  $P = 0.178$  and off flavours  $-F_{2,58} = 2.45$ ,  $P = 0.095$ . The mean rating for oiliness of the flesh varied from 39 to 48, but did not differ significantly among 3 groups of fish ( $F_{2,58} = 2.9$ ,  $P = 0.063$ ). The texture of wild snapper was rated as softer than either of the two groups of captive snapper ( $F_{2,58} = 5.4$ ,  $P = 0.007$ , 5% LSD = 8.42). There was a significant difference in the overall acceptability of 3 groups of fish ( $F_{2,58} = 3.51$ ,  $P = 0.036$ ). SRA

### White amur

1347

Bakir (HM), Melton (SL) and Wilson (JL). **Fatty acid composition, lipids and sensory characteristics of white Amur (*Ctenopharyngodon idella*) fed different diets.** *Journal of Food Science* 58(1); 1993; 90-95

White amur were fed either alfalfa pellets (P) or trout chow (A) for 6 months in laboratory tanks. Compared with fish fed A, fish fed P gained less wt. and had less total lipids (0.73 vs 2.28%). Fish fed P also had higher levels of saturated (SAT),  $\omega$ -3 (PUFA-3), and  $\omega$ -6 (PUFA-6) but lower monounsaturated (MONO) fatty acids (FA) in the neutral lipids and lower SAT, MONO, and PUFA-3 but higher PUFA-6 FA in the phospholipids. Frozen, white amur fed P had flavour and acceptability comparable to unfrozen catfish, but those fed A tended to have less desirable flavour. White amur could be a highly acceptable low fat food fish if fed the correct diet. AA

### Products

#### Keropok

1348

Yu (SY) and Low (SL). **Utilization of pre-gelatinized tapioca starch in the manufacture of a snack food, fish cracker ('Keropok').** *International Journal of Food Science and Technology* 27(5); 1992; 593-596

The use of pre-gelatinized tapioca starch for the manufacture of 'keropok' by drum-drying has been investigated. Processing variables were examined by using 5 different slurries of water:starch, with ratios of 50:50, 60:40, 70:30, 80:20, and 90:10 at 4 different temp.: 120.2°C, 133.5°C, 143.6°C, and 151.8°C. Only 'keropok' made from a slurry with a water:starch ratio of 70:30 pre-gelatinized at 133.5°C, 143.6°C and 151.8°C had linear expansion > the min acceptable value of 77%. 'Keropok' containing pre-gelatinized starch produced at 133.5°C was the most acceptable to a sensory panel. AA

#### Minces

1349

Huidobro (A) and Tejada (M). **Foaming capacity of fish minces during frozen storage.** *Journal of the Science of Food and Agriculture* 60(2); 1992; 263-270

Foaming capacity (FC) of minced muscle of 3 fish species: blue whiting (*Micromesistius poutasson* R), horse mackerel (*Trachurus trachurus* L.) and mackerel (*Scomber scombrus* L.), stored at -18°C, was studied. FC was not diminished by changes in

protein but was affected by the formaldehyde generated during frozen storage. GS

## Sauces

1350

Raksakulthai (N) and Haard (NF). **Correlation between the concentration of peptides and amino acids and the flavour of fish sauce.** *ASEAN Food Journal* 7(2); 1992; 86-90

Fermented Capelin (*Mallotus villosus*) fish sauce (CFS) prepared by mixing salt with fish in a ratio of 1:4 and supplemented with 2.5% (w/w) squid hepatopancreas tissue (SHP) was filtered and fractionated using an ultrafiltration unit with MW cut off 10,000. Sensory evaluation scores of CFS prepared with SHP was significantly higher than the control CFS. Both free and total amino acid (AA) contents in SHP-supplemented sauce were also higher (2.25 and 1.79 fold respectively). Regression analysis of sensory evaluation score and free AA content indicated a significant correlation ( $r = 0.851$ ,  $p < 0.05$ ). Removal of the fraction  $> 10,000$  daltons from CFS by ultrafiltration lowered the acceptability score ( $P < 0.001$ ). Major AA residues in peptides were aspartic acid, serine, glutamic acid and leucine. The typical flavour of CFS was correlated with both free AA and peptides. The acceptable taste of peptides from fish protein hydrolyzate was enhanced by the MW  $> 1,000$  fraction. SRA

## PROTEIN FOODS

1351

Mathur (BN). **Bioprocesses for amelioration of protective factors in infant formulas.** *Indian Dairyman* 45(2); 1993; 58-65

Examines the technical feasibility of incorporating factors like immunoglobulins, lactoferrin, lactoperoxidase and lysozyme in the infant formulations to enhance their bioprotective factors. This makes bottle feeding practice safer by providing humoral protection in the gut against enteropathogenic bacteria among infants. GS

1352

Gennadios (A), Weller (CL) and Testin (RF). **Temperature effect on oxygen permeability of edible protein-based films.** *Journal of Food Science* 58(1); 1993; 212-214, 219

## ALCOHOLIC AND NON-ALCOHOLIC BEVERAGES

1353

Rouseff (RL). **Developments in Food Science 25. Bitterness in foods and beverages.** xviii; 1990; + 356

This volume is a comprehensive text devoted to bitterness in foods and beverages. Various chapters covered include: Bitterness in food products: an overview by Rouseff, R.L. (pp. 1-14); Physiological and therapeutical aspects of bitter compounds by Brieskorn, C.H. (pp. 15-34); Compound structure versus bitter taste by Maga, J.A. (pp. 35-48); Biosynthesis of bitter compounds by Robins, J. JR., Rhodes, M.J.C., Parr, A.J. and Watfon, N.J. (pp. 49-80); Thermally produced bitter-tasting compounds by Maga, J.A. (pp. 81-102); Bitterness in alcoholic beverages by Chialva, F. and Dada, G. (pp. 103-122); Bitterness and astringency, the pyrocyanidins of fermented apple ciders by Lea, A.G.H. (pp. 123-144); Bitterness/astringency in wine by Noble, A.C. (pp. 145-158); Coffee bitterness by McCamey, D.A., Thorpe, T.M. and McCarthy, J.P. (pp. 169-182); Bitter compounds in dairy products by Schmidt, R. (pp. 183-204); Bitter principles in food plants by Fenwick, G.R. and Others (pp. 205-250); Separation and identification of hop bitter compounds in beer by Cowles, J.M. and others (pp. 251-266); Isolation and identification of bitter compounds in defatted soybean flour by Chang, S.S., Huang, A.S. and Ho, C.T. (pp. 267-274); Bitterness in soy and methods for its removal by Marshall, W.E. (pp. 275-292); Biochemistry of lemonoid citrus juice bitter principles and biochemical debittering processes by Hasegawa, S. and Maier, V.P. (pp. 293-308); Cyclodextrin polymers in the removal of bitter compounds in citrus juices by Shaw, P.E. (pp. 309-324); Removal of bitter compounds from citrus products by absorption techniques by Puri, A. (pp. 325-336). A subject index is also included. CSA

## Alcoholic beverages

### Beer

1354

Chan (WH), Lee (AWM) and Cai (PX). **Differential-pulse polarographic microdetermination of ethanol and its application to beer analysis.** *Analyst (London)* 117(9); 1992; 1509-1512

Ethanol, after *in situ* derivatization to ethyl dithiocarbonate under phase-transfer catalysis was determined in aqueous solution by differential-pulse polarography. A supporting electrolyte of  $\text{NH}_4\text{Cl-KH}_2\text{PO}_4\text{-NaOH}$  containing eosin was found to be essential in this detn. For the



microdetermination of ethanol, this method was proved to be precise, and the detection limit was 0.02% or 0.02 mg (absolute amount of ethanol). The viability of the proposed method for beer analysis has also been established. AA

## Wines

1355

Chatonnet (P), Dubourdieu (D), Boidron (J-N) and Pons (M). **The origin of ethylphenols in wines.** *Journal of the Science of Food and Agriculture* 60(2); 1992; 165-178

Ethylphenols are important aromatic compounds of red wines. These compounds are formed in wines by some yeast species belonging to the genus *Brettanomyces/Dekkera* in the presence of hydroxycinnamic acids. These volatile phenols are responsible for the 'phenolic', 'animal' and 'stable' off-odours found in certain red wines. The results presented show that the synthesis of the high quantities of ethylphenols found in the 'phenolic' red wines can occur during the ageing of wines having normally completed their alcoholic and malo-lactic fermentations. This olfactory fault caused by *Brettanomyces/Dekkera* is found more frequently than the classical 'mousy-taint' attributed to this yeast genus. In addition, the study of the mechanisms of biosynthesis of ethylphenols by *Brettanomyces/Dekkera* has shown the sequential activities of two enzymes. The first, is a cinnamate decarboxylase (CD), which assures the transformation of certain cinnamic acids into the correspondent vinylphenols; the second is a vinylphenol reductase, which catalyses the reduction of vinylphenols into ethylphenols. The CD activity of *Brettanomyces/Dekkera* is not inhibited by the polyphenolic compounds of red wines (procyanidins and catechins) while these compounds do inhibit the CD activity of *Saccharomyces cerevisiae*. On the other hand, the substrate specificities of the CD activities of *Brettanomyces/Dekkera* and *Saccharomyces* are different. AA

1356

Gloria del Campo and Lajo (MC). **Spectrophotometric determination of biacetyl in distillates of wine by flow injection.** *Analyst (London)* 117(8); 1992; 1343-1346

The reaction of biacetyl with 1-naphthol and creatine in an alkaline medium has been used to develop a flow injection method for the detn. of biacetyl. Acetoin is the principal interferent and, by exploiting the fact that biacetyl reacts comparatively faster than acetoin, the optimum experimental conditions for increasing the selectivity were found.

Under these conditions, the relationship between the peak height (absorbance) and the concn. of biacetyl was linear up to a concn. of  $10.0 \mu\text{g cm}^{-3}$  with a relative standard deviation (RSD) of 0.74 and 0.37% for 1.0 and  $5.0 \mu\text{g cm}^{-3}$  biacetyl standards ( $n = 10$ ), respectively. The sampling rate was  $30 \text{ h}^{-1}$ . When the method was applied to the detn. of biacetyl in wine, after a separation step for biacetyl by steam distillation, the RSD ranged from 2.7 to 3.3% and the results were in good agreement with those obtained by a conventional spectrophotometric method. AA

## Non-alcoholic beverages

### Coffee

1357

Abdullah (A), Malundo (TMM), Resurreccion (AVA) and Beuchat (LR). **Descriptive sensory profiling for optimizing the formula of a peanut milk-based liquid coffee whitener.** *Journal of Food Science* 58(1); 1993; 120-123

A liquid coffee whitener was formulated using peanut milk as a substitute for sodium caseinate and water. Sensory quality of the formulation was evaluated using a descriptive panel. Six sensory attributes were significantly ( $p < 0.05$ ) affected by the amounts of peanut milk, oil and corn syrup solids in the formulations. The max. amount of peanut milk for an optimum formulation was 40%. The max. fat content increased from 6% to 9% as peanut milk was decreased from 40% to 20%. A concn. of 2-9% corn syrup solids could be used with 20-40% peanut milk. Acceptable formulations within the optimum region contained 6% oil in combination with 40% peanut milk and 2% corn syrup solids or 20% peanut milk and 8% corn syrup solids. AA

### Fruit juices

1358

Contreras (NJ), Fairley (P), McClements (DJ) and Povey (MJW). **Analysis of the sugar content of fruit juices and drinks using ultrasonic velocity measurements.** *International Journal of Food Science and Technology* 27(5); 1992; 515-529

The use of ultrasound to determine the sugar content of fruit juices and drinks has been assessed. The velocity of ultrasound and the density were measured in solutions of D-glucose, D-fructose, and sucrose at various concn. (0-40% w/v) and temp. (10-30°C). The velocity of ultrasound was measured in 50:50 wt:wt mixed solutions of sucrose and D-glucose over the same range of concn. and



temp. Measurements of the velocity of ultrasound, the density and the refractive index were made on various fruit juices and drinks at 20°C. The sugar content of the juices and drinks was determined by enzymatic assay. Ultrasonic measurements are shown to predict sugar contents in pure sugar solutions to within 0.2% w/v and in mixed sugar solutions to within 0.5% w/v. The ultrasonic measurements were sensitive to sugar species. It is shown that ultrasound compares well with other techniques for sugar content detn. in fruit juices and drinks, and has the advantage that the equipment can be used for on-line process control. Applications for this ultrasonic technique are proposed. AA

1359

Maltini (E), Nani (R) and Bertolo (G). **Role of serum viscosity and of pulp content in the vacuum belt drying of pure fruit juices.** *International Journal of Food Science and Technology*; 1992

Vacuum belt drying of fruit juice concentrates may be a satisfactory alternative to freeze-drying where cost is a limiting factor, and to spray-drying where the addition of large amounts of 'carriers', e.g. maltodextrin or glucose syrups, are required to avoid collapse and sticking of the product. The rheological and structural properties and the drying behaviour of some juice concentrates have been studied in relation to the collapse phenomenon, which is a structure transition associated with the mechanical properties of the system. Collapse during drying has proved to be mainly related to the viscosity (consistency) of the soluble fraction of the concentrate, i.e. the 'serum', while there is no evidence of an effect of the suspended phase (pulp). By properly adjusting the serum consistency of the juice with selected pectolytic enzymes and by appropriate mixing of the mash derivatives, apple, pear, apricot, and peach concentrates have been successfully dehydrated by vacuum belt drying, without any addition of 'carrier'-supporting materials. The consistency index of the concentrate serum may be used to assess the suitability of the juice for drying. AA

1360

Creaser (CS), Koupai-Abyazani (MR) and Stephenson (GR). **Gas chromatographic-mass spectrometric characterization of flavanones in citrus and grape juices.** *Analyst (London)* 117(7); 1992; 1105-1109

Reports a method for the characterization of flavanones in fruit juices (orange, lemon, grapefruit and grape juices), involving solvent extraction, hydrolysis to the corresponding aglycones trimethylsilylation and combined GCMS. The

application of the method is demonstrated for the analysis of fruit juices. BV

## Apple juices

1361

Dever (MC), Cliff (M) and Lau (OL). **Maturity and ripening effects on chemical and sensory properties of apple juice.** *Journal of the Science of Food and Agriculture* 60(3); 1992; 355-360

The effects of harvest maturity and ripening on the chemical composition and sensory characteristics of 'McIntosh' and 'Spartan' apple juice were evaluated. Juice was extracted from fruit harvested at seven weekly intervals beginning 3-4 weeks before commercial harvest and from fruit held in air storage (1°C) for 1 to 3 months. Internal ethylene concn. and starch index were used as maturity indices. Principal component analysis of juice data (pH, titratable acidity, organic acids, soluble solids, sugars, phenols, turbidity, and Hunter lab colour) showed a distinctive maturity effect on the characteristics of juice extracted from fruit immediately after harvest or after storage. Triangle testing showed aroma and flavour differences in both 'McIntosh' and 'Spartan' to be first discernable when ethylene was first detected (internal ethylene concn.  $> 0.1 \mu\text{l litre}^{-1}$ ) and starch hydrolysis evident (starch index 3.0-5.0 for 'McIntosh', 1.5-3.0 for 'Spartan'), or after 2-3 months of air storage. Sensory profiling of fruit aroma, total aroma, fruit flavour by mouth, sweetness, and sourness in the juices showed increased fruitiness and sweetness and decreased sourness with advancing maturity. AA

## Grape juices

1362

Garrido (VM), Sims (CA), Marshall (MR) and Bates (RP). **Factors influencing ellagic acid precipitation in muscadine grape juice during storage.** *Journal of Food Science* 58(1); 1993; 193-196

The ellagic acid sediment formed in white muscadine grape juice was quantified by isolation on a membrane (0.45  $\mu\text{m}$ ), dissolving in methanol and HPLC analysis. Heat processing 100°C for 10 min and high storage temp. of 40°C accelerated sediment formation in the juice. Treatment of juice with gelatin (0.05-0.4 g/L juice), egg albumen (6-10 mg/L juice) and polypyrrolidone (0.1-0.2 g/L juice) reduced sediment formation. A commercial pectinase added to grapes, resulted in higher levels of total phenolics in the juice and more sediment formation. Ultrafiltration membranes (10 000, 30



000 and 100 000 daltons MWCO) were effective in reducing sediment formation. SRA

## Kinnow

1363

Ranote (PS), Bawa (AS) and Saini (SPS). **Thermal process for Kinnow - RTS.** *Indian Food Packer* 46(4); 1992; 16-24

The suitability of Kinnow fruit (*Citrus reticulata*) for conversion into ready-to-serve (RTS) beverage and its shelf-life under ambient temp. conditions were evaluated. Results revealed that there were negligible changes in the rheology, pH and acidity values of Kinnow - RTS beverage packed in flexible and rigid bottle and metallic containers stored at 12-38°C during 24 wk storage. Sugar content increased upon prolonged storage while the residual ascorbic acid and recoverable oil were not detected. Products stored in traditional packs like metallic and glass containers showed superior quality. Flexible pouches were economical. GS

1364

Ranote (PS), Saini (SPS) and Bawa (AS). **Shelf life of processed Kinnow juice.** *Research and Industry, India* 38(1); 1993; 15-18

The suitability of flexible container (pouch) for processing and storage of Kinnow mandarin juice was investigated. Analysis of juice over a storage period of 6 months (12-38°C) indicated no discernible changes in most of the constituents. Negligible to slight changes in TSS, TS, acidity, pH, ash, protein and viscosity were recorded. Invert sugars improved while total sugars declined with the passage of time under ambient conditions. Cans retained higher amount of ascorbic acid during storage due to preventive effect against light. Various sensory attributes were significantly affected by packaging and storage. Though the comparative storage life was less in flexible pouch, yet it has promising future as a viable substitute because of many logistic advantages over traditional containers. AA

## Lemon juices

1365

Achiwa (Y), Kada (T) and Namiki (K). **Inhibition of N-nitrosomorpholine formation by lemon juice.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 38(9); 1991; 826-830

Effect of lemon juice on formation of N-nitrosomorpholine was investigated on a reaction

of morpholine and sodium nitrite. Lemon juice concentrate was added to the mixture of morpholine and sodium nitrite and formation of N-nitrosomorpholine was determined by HPLC analysis. Inhibitory effect on the N-nitrosomorpholine formation was 26% (in air) and 36% in (in air), 16% (in N<sub>2</sub>) and 35% (in N<sub>2</sub>), respectively, by the addition of original juice and 2-fold concentrated juice. Inhibitory effect on the N-nitrosomorpholine formation was 5% (2 mM, in air), 23% (5 mM, in air), 57% (10 mM, in N<sub>2</sub>) and 100% (20 mM, in air), 22% (2 mM, in N<sub>2</sub>), 57% (5 mM, in air) and 100% (10 mM and 20 mM, in N<sub>2</sub>) by the addition of ascorbic acid. Inhibition of ascorbic acid in lemon juice on the nitrosation of morpholine was 7.4%. Therefore the presence of inhibitory factors other than ascorbic acid in the lemon juice was estimated. AA

## Raspberry juices

1366

Withy (LM), Nguyen (TT), Wrolstad (RE) and Heatherbell (DA). **Storage change in anthocyanin content of red raspberry juice concentrate.** *Journal of Food Science* 58(1); 1993; 190-192

The red raspberry juice concentrate (RRJC) stored for 3 months at +20°C showed significant decrease in cyanidin-3-sophroside and cyanidin-3-glucorutinoside and increase in cyanidin-3-glucoside. By comparison, levels of anthocyanins of RRJC changed slightly when stored for 3 months at -20°C. SRA

## Tea

1367

Katiyar (SK) and Bhatia (AK). **Epicatechin derivatives and fatty acid composition of a traditional product made in Sikkim from leaves of *Camellia sinensis*.** *Journal of the Science of Food and Agriculture* 60(2); 1992; 271-273

A traditional product of *Camellia sinensis* leaves was recorded in tribal areas of Sikkim State, India. The product was analysed for its epicatechin derivatives, and for its neutral lipid, glycolipid and phospholipid contents together with their fatty acid compositions. (-)-Epigallocatechin-3-gallate (EGCG) was the main polyphenolic constituent present in this traditional product, accounting for 742 g kg<sup>-1</sup> of total epicatechin derivatives. Glycolipids, which account for 570 g kg<sup>-1</sup> of total lipid, contained a significantly greater amount of linolenic acid (C18:3, 546 g kg<sup>-1</sup> of glycolipid) than the neutral lipids or phospholipids. Palmitic (C16:0) and linoleic (C18:2) acids were in greater proportion in the phospholipid fraction, while myristic (C14:0) and lauric (C12:0)

were abundant in the neutral lipid. Since EGCG is a known antimutagenic and anticarcinogenic agent, this traditional tea product may have considerable pharmacological significance. AA

## FATS AND OILS

1368

Hierro (MTG) and Santa-Maria (G). **Supercritical fluid extraction of vegetable and animal fats with CO<sub>2</sub> - A mini review.** *Food Chemistry* 45(3); 1992; 189-192

The efficiency of the extraction increases with pressure (higher than 345 bar), and temp. The use of entrainers enhanced the extraction of lipids. Some procedures developed for extraction of glycerides containing polyunsaturated fatty acids from animal fats are listed which are useful in pharmacological applications. The extraction of cholesterol from fat and fractionation of milk fat yielding fractions with short and medium chain fatty acids enriched in cholesterol and fractions with medium- and long-chain fatty acids low in cholesterol are reviewed. 25 references. SD

### Oils

1369

Sajid Husain, Nageswara Sarma (P), Sastry (GSR), Swami (GYSK) and Prasad Raju (N). **Evaluation of coconut and hydrogenated soybean oils as stationary phases for GLC.** *Indian Journal of Technology* 31(2); 1993; 103-108

Both coconut and hydrogenated soybean oils appear to be potential stationary phases for GLC. Classification of these stationary phases done according to McReynold's scheme, Novak's thermodynamic approach and Snyder's selectivity triangle are found to fall in the medium polar range. SRA

1370

Marinova (EM) and Yanishlieva (NV). **Effect of temperature on the antioxidative action of inhibitors in lipid autoxidation.** *Journal of the Science of Food and Agriculture* 60(3); 1992; 313-318

Purified lard triacylglycerols have been oxidised at 25, 50, 75 and 100°C in the presence and absence of 0.2-2.0 g kg<sup>-1</sup> (0.45-10.3 mmol litre) of the antioxidants  $\alpha$ -tocopherol and ferulic acid. Increasing the temp. does not influence the effect of ferulic acid on the induction period or the rate of autoxidation,  $\alpha$ -tocopherol is more effective at extending the induction period and reducing the

rate of autoxidation as the temp. is increased. The rate of substrate oxidation increases with increasing  $\alpha$ -tocopherol concn., especially at lower temp., but decreases with increasing ferulic acid concn. This behaviour is explained in terms of the participation of antioxidant molecules and radicals in the autoxidation process. High-temp. oxidation results can be extrapolated only to room temp. when no change occurs in the antioxidative mechanism. AA

1371

Pinthus (EJ), Weinberg (P) and Saguy (IS). **Criterion for oil uptake during deep-fat frying.** *Journal of Food Science* 58(1); 1993; 204-205, 222

The effect of added powdered cellulose and methyl cellulose (Methocel) on oil uptake during deep-fat frying (DFF) of donuts and falafel balls is reported. The oil uptake criterion UR, was applied and found to be valuable in the assessment of effectiveness of reducing oil uptake during DFF. Methocel was more effective than powdered cellulose in reducing oil uptake. SRA

1372

Park (PSW). **Loss of volatile lipid oxidation products during thermal desorption in dynamic headspace-capillary gas chromatography.** *Journal of Food Science* 58(1); 1993; 220-222

Unsaturated aldehydes from lipid oxidation, t-2-hexenal, t-2-heptenal, t, t-2,4-heptadienal and t,t-2,4-decadienal were investigated for structural alteration during dynamic headspace (DHS)-GC analysis. After thermal desorption during which the GC carrier gas, hydrogen, flowed through Tenax TA adsorbent trap, both 2-alkenals and 2,4-alkadienals produced partially and fully hydrogenated compounds as artifacts. The loss due to hydrogenation was most severe with 2,4-decadienal, its recovery being 31.2%. Hydrogenated artifacts were not observed after thermal desorption with helium as the GC carrier gas. It is recommended that helium instead of hydrogen be used as the carrier gas in conducting DHS-GC analysis of unsaturated lipid oxidation compounds. AA

### Soybean oils

1373

Jung (MY) and Min (DB). **Effects of oxidized  $\alpha$ -,  $\beta$ - and  $\gamma$ -tocopherols on the oxidative stability of purified soybean oil.** *Food Chemistry* 45(3); 1992; 183-187



Oxidized tocopherols were prepared in methanol containing methylene blue for 30 h under light and their oxidative stability of purified soybean oil in the dark at 55°C were studied. As the concn. of oxidized tocopherol increased, the peroxide values increased and headspace oxygen decreased. They showed significant pro-oxidant effect on the peroxide value and headspace oxygen of soybean oil. SD

## SPICES AND CONDIMENTS

1374

Kim (MR) and Rhee (HS). **Decrease of pungency in "Radish Kimchi" during fermentation.** *Journal of Food Science* 58(1); 1993; 128-131, 137

Acidity in radish kimchi increased with fermentation time, resulting in a gradual decrease in pH. Decrease of pungency was accompanied by a decrease in 4-methylthio-3-butenyl isothiocyanate (MTB-NCS) in the homogenate. Optimum flavour occurred on the third day of fermentation when MTB-NCS concentration was 6.6±2 µmoles/100 g. The decrease in MTB-NCS concn. was accompanied by the gradual loss of 4-methylthio-3-butenyl glucosinolate (MTB-glucosinolate), which occurred more rapidly than the decline in total glucosinolates. Ascorbic acid-dependent myrosinase activity declined gradually until the third day of fermentation, although ascorbic acid content remained above that required for maximal enzyme activity. AA

## Pickles

1375

Usha Rani (M), Rama Rao (SN), Girija Bai (R) and Nagaraja (KV). **Studies on quality standards of Indian commercial pickle.** *Indian Food Packer* 46(4); 1992; 27-33

Commercial pickles - oil/brine/vinegar based, stored at room temp. (RT) and 37°C for a yr were analysed for moisture, salt, pH, acidity, total oil, drainable oil, fluid portion, insect fragments/filth, trace elements, heavy metals and free fatty acid (FFA). Moisture, salt, pH, acidity, total oil, drainable oil and fluid portion showed no considerable change. FFA of oil pickles increased both at RT and 37°C. Heavy metal contaminants viz. Ar, Cd, Pb, Cu and Zn were within PFA/FPO limits. Tin and Fe contents of pickles stored in plain cans, and lacquered cans except polythene bag enclosed in lacquered can increased both at RT and 37°C. Samples with Sn and Fe contents exceeding 200 p.p.m. and 20 mg % respectively gave metallic after-taste. Samples in food grade polyethylene bags kept in lacquered can showed improved quality. GS

## Olives

1376

Garcia (P), Brenes (M), Vattan (T) and Garrido (A). **Kinetic study at different pH values of the oxidation process to produce ripe olives.** *Journal of the Science of Food and Agriculture* 60(3); 1992; 327-331

The kinetics of the oxidation process to produce ripe olives were studied. The sodium hydroxide solutions used for treating the ripe olives contain the same polyphenols as the olives treated with these solutions. These liquids could be utilized as model systems to study the oxidation reactions of polyphenols. However, oxidation of the olive surface was remarkably slower because the diffusion rate of oxygen into the flesh of the fruit was very low. Oxidation of the polyphenols (hydroxytyrosol and caffeic acid) in the sodium hydroxide solutions followed first-order kinetics. The values of the constant for hydroxytyrosol were higher than those for caffeic acid and darkening of the liquids. Olive and solution colour were darker and oxidation rates increased with increasing pH. AA

## Pepper

1377

Pino (JA), Borges (P) and Sanchez (R). **Alcohol deterpenation of black pepper oil.** *International Journal of Food Science and Technology* 27(5); 1992; 551-555

The alcohol extraction of black pepper oil using 3 different oil to 60%-alcohol ratios was studied. Quantitative composition of the oils was established through their physical constants and GLC. The 1:2 oil to 60% ethanol ratio showed the lowest oil recovery but resulted in sesquiterpeneless oil with the lowest terpene content and closest in sensory profile to the original oil. AA

## SENSORY EVALUATION

1378

Lawless (H), Torres (V) and Figueroa (E). **Sensory evaluation of hearts of palm.** *Journal of Food Science* 58(1); 1993; 134-137

Hearts of palm were evaluated for their sensory properties using descriptive analysis and consumer appeal using consumer acceptance tests. Four var. of canned product, two from wild species and 2 from cultivated sp. and 1 fresh cultivated var. were

evaluated. Important sensory terms for texture, aroma and flavor were determined. Differences were observed between fresh and canned samples, with fresh samples firmer, sweeter, and less briny tasting. In spite of this difference, consumer reaction to the fresh samples was mixed, with a marked bimodal trend for acceptability of the firmer texture. Acceptability of the product in general (probed after the sensory test) was related to consumers previous exposure. A majority of those previously familiar with the vegetable expressed liking, while about half those who never tried the product before expressed liking. AA

1379

Rao (MA), Van Buren (JP) and Cooley (HJ). **Rheological changes during gelation of high-methoxyl pectin/fructose dispersions: Effect of temperature and aging.** *Journal of Food Science* 58(1); 1993; 173-176, 185

Gels made with 0.5% and 1% pectin in 60% fructose, and a commercial sample exhibited macromolecular solution/weak gel behavior. Cooling the gels from 50-10°C increased storage ( $G'$ ) and loss moduli ( $G''$ ) of the gels. As the rate of cooling (10, 5.7, and 2.5°C/h) a 1% pectin, 60% fructose, dispersion increased, the elasticity of the formed gel decreased; however,  $G''$  was not affected much by rate of cooling. During the first 24 h, the changes in  $G'$  and  $G''$  were small. After 14 days storage at ambient temp.,  $G'$  values of gels increased substantially, while  $G''$  values increased slightly. AA

1380

Gay (C) and Mead (R). **A statistical appraisal of the problem of sensory measurement.** *Journal of Sensory Studies* 7(3); 1992; 205-228

Standard interval scales for sensory measurement are frequently arbitrary. In some situations the self-adjusting scale method has advantages, especially when the assessor training is insufficient and in consumer testing. When a small number of treatments are compared together in one block, say 3, then rank analysis by Pettitt is found more efficient than the self-adjusting scale. SD

1381

Pritchett Mangan (PA). **Performance assessment of sensory panelists.** *Journal of Sensory Studies* 7(3); 1992; 229-252

Statistics developed using replication variance of individual stimulus evaluations and scale utilization across a panelists' stimulus profile to enable comparison of panelists to each other, detn. of attributes where there was confusion, isolation of

stimuli having unstable properties and engagement of influence wt. In subsequent analysis of data. The methodology developed could be adopted to other situations where replicated detn. from bounded quantitative scales used. SD

## FOOD STORAGE

Nil

## INFESTATION CONTROL AND PESTICIDES

1382

Susha (C) and Kamavar/ (GK). **Effect of azadirachtin on vitellogenic oocyte development in *Trogoderma granarium* Everts (Coleoptera: Dermestidae).** *Indian Journal of Experimental Biology* 31(2); 1993; 188-190

Azadirachtin, a major component of neem seed extract, inhibits feeding, growth and reproduction in insects. In *Tr. granarium* a reduction in the vitellogenic number was observed when pupae were topically treated with azadirachtin. Disruption of the hormonal control of oocyte development is hypothesized to be the mode of action of azadirachtin. SRA

1383

Bhattacharya (PR). **Insecticidal crystal protein ( $\delta$ -endotoxin) production in *Bacillus thuringiensis* var. *israelensis* is independent of sporulation specific functions.** *Indian Journal of Experimental Biology* 31(3); 1993; 247-251

Results showed that the processes of crystal production and those of sporulation are not dependent on each other and the synthesis and assembly of crystal protein can occur without the expression of spore specific functions at least in some cases, if not all, of crystal proteins. Crystal proteins are synthesized independent of sporulation specific functions and they also exhibit toxic effect. SRA

## BIOCHEMISTRY AND NUTRITION

1384

Sangeeta Kaul and Krishnakantha (TP). **5'-nucleotidase activity in retinol deficiency induced albino rats.** *Indian Journal of Experimental Biology* 31(2); 1993; 147-150



Retinol deficient rat liver, kidney and spleen showed a significant decrease in their enzyme activity (36 to 50%) compared to controls. The lectins could stimulate the enzyme activity in retinol deficient group by 57.6 to 92% compared to controls (13.3 to 74%). Detergents increased the enzyme activity in retinol deficient tissue microsomes by 4.5-80% in comparison to controls (10.3 to 119%). The results reveal alterations in membrane structure induced by retinol deficiency. AA

1385

Kurup (PG) and Krishnamurthy (S). **Glycemic response and lipemic index of rice, ragi and tapioca as compared to wheat diet in human.** *Indian Journal of Experimental Biology* 31(3); 1993; 291-293

Carbohydrate rich diet, rice, ragi (*Eleusine coracana*) or tapioca given to individuals of both sexes for 15 days did not alter the glycemic response (after oral glucose loading) as compared to an isocaloric wheat basal background diet. However, plasma cholesterol profile was reduced significantly by ragi and tapioca. Ragi reduced total serum cholesterol; low density lipoprotein cholesterol by 9% each, triglycerides by 15% and increased high density lipoprotein cholesterol, showing a significant beneficial effect on plasma cholesterol profile. Lipemic index as introduced in the present study was 121, 57 and 55 for rice, tapioca and ragi respectively. when base line value of the isocaloric wheat supplemented back ground diet (control) was taken as 100. SRA

1386

Ramakrishnan (S), Venugopal Rao (A) and Pugalendi (KV). **Dietary protein and cholesterol metabolism in small intestines.** *Indian Journal of Experimental Biology* 31(3); 1993; 294-296

Effect of quality and quantity of dietary protein on blood cholesterol and cholesterol metabolism in small intestines of rat was examined. Compared to casein, Bengalgram in the diet decreased blood and intestinal cholesterol. It is suggested that this effect may be due to low levels of leucine in Bengalgram protein and less release of insulin, an activator of HMG CoA reductase. Low casein in the diet (12%) caused a decrease of blood and intestinal cholesterol while high casein in the diet (24%) caused a decrease of intestinal cholesterol only. It is suggested that both quality-wise and quantity wise, dietary protein influences body cholesterol. AA

1387

Kamala Krishnamurthy and Leela Raman. **Proceedings of Nutrition Society of India.** 37; 1991; xiii + 405

This volume provides the latest state-of-art on frontier areas of nutrition of global concern. The lectures include nutritional effects of palm oil: Myths and facts by Chang, Y.H. (pp. 41-58) and effect of mango consumption of vitamin A nutriture by Urmila Pingle and Sivakumar, B. (pp. 373-379). CSA

1388

Lim-Sylianco (CY) and Sylianco-Wu (L). **Antigenotoxic effects of B-vitamins.** *ASEAN Food Journal* 7(2); 1992; 100-104

The B-vitamins-thiamin, riboflavin, niacin, pyridoxine, pantothenic acid, folic acid, biotin and vitamin B-12 reduced the chromosome breaking effects induced by aflatoxin B-1, aflatoxin G-1, benzidine, dimethylnitrosamine, ethylmethanesulfonate (EMS), methyl-methanesulfonate (MMS) methylcholathrene (MC) metronidazole (MN) and safrole. Highest antigenotoxic activity was exhibited by niacin against MC threne and MN, EMS and MMS; PA against safrole and riboflavin against dimethylnitrosamine. SRA

1389

Jayasekara (S), Samarajeewa (U) and Jayakody (AN). **Trace metals in foods of animal origin in Sri Lanka.** *ASEAN Food Journal* 7(2); 1992; 105-107

Distribution of trace metals were examined in edible parts of cattle, goat, chicken, pork, canned fish and cows milk, buffalo's milk and egg. Trace metals range: in cattle - Co 0.90 plus or minus 0.17 (kidney) to 2.11 plus or minus 0.78 (spleen), Cu 0.08 plus or minus 0.01 (tongue) to 8.48 plus or minus 0.80 (liver), Mn 0.50 plus or minus 0.28 (muscle) to 5.45 plus or minus 0.25 (intestine), Zn - 1.57 plus or minus 0.37 (lung) to 13.45 plus or minus 1.12 (liver); goat - Co - 0.57 plus or minus 0.10 (muscle) to 8.58 plus or minus 0.15 (brain), Cu - 0.19 plus or minus 0.02 (brain) to 13.75 plus or minus 1.72 (liver); Mn 0.09 plus or minus 0.01 (liver) to 3.65 plus or minus 1.14 (brain), Zn - 1.16 plus or minus 0.17 (brain) to 4.17 plus or minus 0.17 (liver); Chicken - Co - 0.09 plus or minus 0.02 (muscle) to 2.87 plus or minus 0.72 (gizzard), Cu - 0.82 plus or minus 0.04 (liver) to 1.70 plus or minus 0.61 (gizzard), Zn - 1.90 plus or minus 0.31 (muscle) to 5.84 plus or minus 0.57 (liver); pork - Co - 0.11 plus or minus 0.02 (heart) to 0.56 plus or minus 0.34 (muscle), Cu - 0.03 plus or minus 0.01 (heart) to 2.59 plus or minus 0.84 (liver), Mn - not detected, Zn 0.03 plus or minus 0.01 (heart) to 2.59 plus or



minus 0.84 (liver); canned fish Co - 0.17 plus or minus 0.04 (fluid) to 1.62 plus or minus 0.32 (tissue), Cu - 0.14 plus or minus 0.04 (fluid) to 2.60 plus or minus 0.84 (tissue), Zn - 0.12 plus or minus 0.03 (fluid) to 3.88 plus or minus 0.23 (tissue); cow's milk - Co - 0.11 plus or minus 0.05, Cu - 0.03 plus or minus 0.01, Mn 0.03 plus or minus 0.01, Zn 0.15 plus or minus 0.05; buffalo's milk - Co 0.60 plus or minus 0.13, Cu - 0.13 plus or minus 0.04, Mn - not detected, Zn - 0.09 plus or minus 0.01; egg - Co 0.21 plus or minus 0.12, Cu 0.05 plus or minus 0.01, Mn - not detected, Zn 0.71 plus or minus 0.28. SRA

1390

Narasinga Rao (BS). **Nutritional considerations in food processing: Process optimization for nutrient conservation - A national priority.** *Indian Food Industry* 11(5); 1992; 28-33

Facts about the nutrient losses during processing of foods and how they can be minimized with improved processing technology with respect to certain foods (cereal and legume grains, oilseeds and fat, fruits and vegetables) which are processed on large scale, marketed and consumed widely are discussed. The process conditions for maximal conservation of nutrients are also highlighted. CSA

1391

Ho (TA), Alldrick (AJ) and Rowland (IR). **Effect in vitro of arachidonic acid, eicosapentaenoic acid and docosahexaenoic acid on the hepatic, activation of dietary genotoxins by rat post-mitochondrial fractions.** *Food and Chemical Toxicology* 30(10); 1992; 853-858

The effect of arachidonic acid, eicosapentaenoic acid and docosahexaenoic acid on the conversion of the heterocyclic amine 2-amino-3-methylimidazo [4,5-f] quinoline (IQ) to its genotoxic metabolites was investigated using a modified bacterial mutation assay. The assay used *Salmonella typhimurium* TA98 as an indicator of the mutagenicity and hepatic post-mitochondrial fractions (S-9) from male Sprague-Dawley rats as the activating system. All three fatty acids inhibited the mutagenicity of IQ without effect on the uptake of the active metabolites and/or on the DNA repair processes within the bacterial cell. The activation of three other food mutagens, 2-amino-3,8-dimethylimidazo [4,5-f] quinoxaline (MeIQx), 2-amino-1-methyl-6-phenylimidazo [4,5-b] pyridine (PhIP) and aflatoxin B1 (AFB1) was also inhibited by these fatty acids. AA

1392

Shichino (Y), Tatemotsu (M), Ohshima (H), Bartsch (H), Furihata (C), Ito (N). **Effects of hickory-smoke condensate on development of pepsinogen**

**1-altered pyloric glands in rats.** *Food and Chemical Toxicology* 30(10); 1992; 859-864

Hickory-smoke condensate (HSC) is a popular food flavouring in the USA. Available data have suggested that this food additive has tumour-initiating/promoting potential. Accordingly, a commercial HSC has been investigated for its capacity to promote tumours in the rat glandular stomach using pepsinogen 1 (Pg 1)-altered pyloric glands (PAPG) as the marker of preneoplastic lesions. The development of PAPG initiated by a single intragastric administration of N-methyl-N'-nitroso-N-nitrosoguanidine was significantly increased by feeding rats a diet containing 5% HSC; no effect was observed with lower doses (1.25 or 2.5%) of HSC. The results suggest that HSC has weak tumour-promoting potential in the rat glandular stomach. AA

1393

Paraf (A). **A role for monoclonal antibodies in the analysis of food proteins.** *Trends in Food Science and Technology* 3(10); 1992; 263-267

Reviews the role of a range of monoclonal antibodies (MAbs) in the analysis of food proteins; authenticity testing and detection of adulteration, monitoring structural changes that occur during thermal processing, the detection of known food allergens; the characterization of fermentation starter cultures; and quality control of food stuffs. 45 references. GS

1394

McGaw (BA). **Trace studies of nutrient bioavailability using 'naturally enriched' <sup>13</sup>C-labelled substrates.** *Trends in Food Science and Technology* 3(10); 1992; 268-271

Reviews the attempts for exploitation of natural variations in <sup>13</sup>C-enrichment of certain plant species; the use of these plants as 'naturally enriched' substrates for measuring body tissues and stores; and the bioavailability of nutrients in humans. 16 references. GS

1395

Alcock (SC), Finglas (PM) and Morgan (MRA). **Production and purification of an R-protein-enzyme conjugate for use on a microtitration plate protein-binding assay for vitamin B12 in fortified food.** *Food Chemistry* 45(3); 1992; 199-203

The limit of detection of the assay developed was 9 pg per well and the assay sensitivity 0.09 µg/100 g of food. The immobilized phase of assay, a



B12-keyhole limpet haemocyanin passively adsorbed to the plate wells, was synthesized and it was simple to perform. SD

## TOXICOLOGY

1396

Trivedi (AB), Doi (E) and Kitabatake (N). **Toxic compounds formed on prolonged heating of citrinin under watery conditions.** *Journal of Food Science* 58(1); 1993; 229-232

1397

Sato (M), Furukawa (F), Toyoda (K), Mitsumori (K), Nishikawa (A), Takahashi (M). **Lack of carcinogenicity of ferric chloride in F344 rats.** *Food and Chemical Toxicology* 30(10); 1992; 837-842

The carcinogenicity of ferric chloride, a compound, that is used as a food additive throughout the world to modified milk powder, was examined in F344 rats of both sexes. Results indicated that ferric chloride exerts no carcinogenic activity in F344 rats when administered as a 0.25 or 0.5% solution continuously in the drinking water for up to 2 yr. BV

1398

Schdatter (J), Wurgler (FE), Kranzlin (R), Maier (P), Holliger (E), Graf (V). **The potential genotoxicity of sorbates: Effects on cell cycle in vitro in V79 cells and somatic mutations in *Drosophila*.** *Food and Chemical Toxicology* 39(10); 1992; 843-851

Sodium sorbate, potassium sorbate and an oxidation product of sodium sorbate, 4,5-epoxy-2-hexenoic acid, were tested for their genotoxic potential in cultured V79 Chinese hamster cells and in somatic cells of *Drosophila*

*melanogaster* (wing spot test, SMART). In *Drosophila* only the epoxide showed a weak genotoxic effect. In V79 cells, freshly prepared sodium sorbate solutions at the highest concn. only (2.5 mg/ml, 24 hr exposure) arrested mitosis at the G2/M cell cycle phase and potassium sorbate (2.5 mg/ml) had no effect. This arrest was reversible after a 24-hr recovery interval. Sodium sorbate solutions stored for up to 208 days were cytotoxic at 2.5 mg/ml, induced cell cycle arrest in the G2/M phase and increased cellular protein content, indicating an action similar to spindle poisoning and a chemical stress reaction (adaptation processes, modification of transcription). Potassium sorbate solutions stored for 28 days were also cytotoxic. With 4,5-epoxy-2-hexenoic acid at concn. upto 0.01 mg/ml no effects were seen. At higher concn. (at least 0.1 mg/ml) cell killing was observed, which probably resulted from unphysiologically lowered pH in the culture medium. Overall, the results are interpreted as an indication of a weak genotoxic potential of stored sodium sorbate solutions. Thus sorbic acid and its potassium salt at the concn. used for food preservation can still be considered as safe for human consumption. AA

1399

Culvenor (CCJ). **Toxic plant constituents in foods.** *Food Australia* 44(2); 1992; 73-75

Few toxic constituents of plants in regular food supply of Australia, which occur at low levels, exert chronic toxicity and are either known to be or probably carcinogenic: the toxins cycads, mushrooms and bracken, and pyrrolizidine alkaloids are briefly discussed in this article. SRA

## FOOD LAWS AND REGULATIONS

Nil





# AUTHOR INDEX

- AFST(I) (Mysore)  
1283
- Abdullah (A)  
1357
- Abichandani (H)  
1211
- Achiwa (Y)  
1365
- Ahmad (MH)  
1253
- Ahmed (R)  
1281
- Ahn (DU)  
1329
- Ajay (G)  
1279
- Ajuyah (AO)  
1329
- Alcock (SC)  
1395
- Alldrick (AJ)  
1391
- Alvarado (MG)  
1248
- Anandha Rao (M)  
1330
- Anderson (ME)  
1313
- Aranda (M)  
1321
- Arihara (K)  
1216
- Arnold (RN)  
1310
- Arora (KL)  
1297
- Arp (SC)  
1310
- Arul (J)  
1278
- Arun Kumar (GC)  
1226
- Asemota (HN)  
1253
- Atienza (J)  
1286
- Aubourg (S)  
1338
- Azam-Ali (SN)  
1231
- Azuara (E)  
1205
- Babbitt (JK)  
1323 1336
- Babic (I)  
1247
- Bajwa (IS)  
1328
- Bakir (HM)  
1347
- Balkissoon (F)  
1270
- Banerji (RK)  
1279
- Banon (S)  
1289
- Baron (RF)  
1232
- Barth (MM)  
1256
- Bartsch (H)  
1392
- Bastias (JM)  
1321
- Basu (CK)  
1266
- Bates (RP)  
1362
- Batish (VK)  
1291
- Bawa (AS)  
1363 1364
- Bell (JD)  
1346
- Bell (LN)  
1214
- Beristain (CI)  
1205
- Bermudez (A)  
1274
- Berry (BW)  
1311
- Bertolo (G)  
1359
- Beuchat (LR)  
1357
- Bhatia (AK)  
1367
- Bhattacharya (PR)  
1383
- Bhattacharyya (AR)  
1318
- Bhavadasan (MK)  
1284
- Bhowmik (SR)  
1260
- Blanchard (SP)  
1326
- Bodyfelt (FW)  
1288
- Boidron (J-N)  
1355
- Bonnet (M)  
1314
- Borges (P)  
1377
- Bouillanne (C)  
1241
- Bouquant (J)  
1222
- Bouzas (J)  
1335
- Brenes (M)  
1376
- Briones (GL)  
1222
- Brough (SH)  
1231
- Buchanan (RL)  
1218 1219
- Bureau (G)  
1222
- Cai (PX)  
1354
- Carpi (G)  
1259
- Cassens (RG)  
1216
- Castaigne (F)  
1278
- Castrillo (M)  
1274
- Chakraborty (BK)  
1297
- Chambroy (Y)  
1222
- Chan (KM)  
1306
- Chan (W-Y)  
1271
- Chan (WH)  
1354
- Charles (JC)  
1345
- Chatonnet (P)  
1355
- Chiang (B-H)  
1271
- Chiba (M)  
1290
- Claassen (MR)  
1285
- Cliff (M)  
1361
- Contreras (NJ)  
1358
- Cooksey (K)  
1307
- Cooley (HJ)  
1379

Cornforth (DP)	Fiddler (W)	Grompone (MA)
1315	1323	1342
Cortes (R)	Figuerola (E)	Grover (S)
1205	1378	1291
Creaser (CS)	Finglas (PM)	Guerrero (A)
1360	1395	1319
Culvenor (CCJ)	Fletcher (GC)	Guilbert (S)
1399	1345	1227
Cuq (J-L)	Fujimoto (K)	Guiraud (J)
1227	1304	1247
Daeschel (MA)	Fujio (Y)	Gupta (VK)
1288	1238 1243	1293 1297
Dall'Aglio (G)	Furihata (C)	Guruprasad (KN)
1259	1392	1257
d'Amour (J)	Furukawa (F)	Haard (NF)
1278	1397	1350
Dave (JM)	Gaal (O)	Haishun (J)
1295 1296	1331	1327
Decker (EA)	Gallardo (JM)	Hale (M)
1306	1338	1323
deLeon (SY)	Garcia (HS)	Hardin (RT)
1267	1205	1329
Demertzis (PG)	Garcia (P)	Hardy (J)
1320	1376	1289
Desmazeaud (MJ)	Garcia Zepeda (CM)	Hashimoto (H)
1241	1316	1290
Dever (MC)	Garrido (A)	Hassan (HN)
1361	1376	1302
Dhir (DS)	Garrido (VM)	Hayakawa (I)
1328	1362	1238 1243
Dickson (JS)	Gates (RA)	Hayashi (N)
1312 1313	1323	1238 1243
Dodd (NJF)	Gay (C)	Hearnsberger (JO)
1327	1380	1339
Dodeja (AK)	Gennadios (A)	Heatherbell (DA)
1211	1352	1366
Doi (E)	Genovese (MI)	Herrero (MA)
1396	1244	1286
Dondero (M)	Ghizzoni (C)	Hierro (MTG)
1335	1259	1368
Dubourdieu (D)	Ghorpade (VM)	Hilbert (G)
1355	1315	1247
Ebana (RUB)	Girija Bai (R)	Ho (C-T)
1258	1375	1213
Eipeson (WE)	Gloria del Campo.	Ho (TA)
1260	1356	1391
Ellekjaer (MR)	Godber (JS)	Holliger (E)
1305	1334	1398
Erickson (MC)	Gomez (MH)	Hosoda (M)
1340 1341	1245	1290
Esguerra (EB)	Gontard (N)	Hosono (A)
1268	1227	1290
Essien (AJ)	Gosselin (C)	Hsieh (YL)
1258	1278	1330 1332
Eun (J-B)	Gothwal (PP)	Huang (VT)
1339	1284	1212
Fairley (P)	Goyal (GK)	Huidobro (A)
1358	1299	1349
Fernandez (M)	Graf (V)	Hunt (MC)
1342	1398	1316



Hwang (KT)

1343

Hwang (S-J)

1229

Ito (N)

1392

Itoh (K)

1224

Itoh (M)

1216

Iyengar (V)

1215

Izzo (HV)

1213

Jagerstad (IM)

1208

Jagerstad (M)

1207

Jahncke (M)

1323

Jain (A)

1263

Jakhu (R)

1199

Jayakody (AN)

1389

Jayasekara (S)

1389

Jood (S)

1228

Joshi (KC)

1239

Joshi (SV)

1198

Joy (CPH)

1333

Jung (D-S)

1288

Jung (MY)

1373

Kada (T)

1365

Kalra (MS)

1223

Kamala Krishnamurthy

1387

Kamavar (GK)

1382

Kamel (BS)

1282

Kanawjia (SK)

1292

Kantt (CA)

1335

Kapoor (A-C)

1228

Kashima (M)

1304

Kastner (CL)

1316

Katiyar (SK)

1367

Kawada (K)

1268

Kawamura (S)

1224

Kejriwal (NM)

1261

Kenney (PB)

1316

Kennish (JM)

1344

Kerbel (EL)

1256

Khan (AQ)

1281

Kim (BK)

1308 1309

Kim (JM)

1339

Kim (MR)

1374

Kinsella (JE)

1300

Kishi (M)

1298

Kitabatake (N)

1396

Kitagawa (H)

1268

Klawitter (LA)

1218 1219

Klein (BP)

1307

Kondaiah (N)

1325

Kondo (Y)

1216

Kondyli (E)

1320

Kontominas (MG)

1320

Kopp (J)

1314

Koria (RG)

1280

Koupai-Abyazani (MR)

1360

Kramer (DE)

1344

Kranzlin (R)

1398

Kremers (W)

1319

Krishnakantha (TP)

1384

Krishnamurthy (S)

1385

Kropf (DH)

1316

Kruger (J)

1317

Kubota (K)

1251

Kudou (S)

1237

Kulkarni (SD)

1239

Kumbhar (BK)

1273

Kurup (PG)

1385

Kushida (H)

1216

Labuza (TP)

1214

Lajo (MC)

1356

Lajolo (FM)

1244

Landon (M)

1241

Lau (OL)

1361

Lawless (HT)

1285 1378

Lea (JS)

1327

Lebovics (VK)

1331

Lee (AWM)

1354

Lee (E)

1334

Lee (JK)

1245

Lee (S-Y)

1294

Leela Raman

1387

Lim-Sylianca (CY)

1267 1388

Lindsay (JA)

1217

Litchfield (JB)

1210

Liu (H)

1252

Low (SL)

1348

Lozano (JE)

1269

Lsalsangzuala (J)

1201

Luchansky (JB)

1216

Lund (DB)

1212

Lurie (S)

1275

Lyon (BG)  
 1276  
 Maduako (O)  
 1240  
 Maeshige (S)  
 1251  
 Magee (TRA)  
 1249  
 Mahmoud (R)  
 1301  
 Maier (P)  
 1398  
 Majeed (SA)  
 1255  
 Mallorca (R)  
 1267  
 Maltini (E)  
 1359  
 Malundo (TMM)  
 1357  
 Maquieira (A)  
 1286  
 Marinova (EM)  
 1370  
 Marshall (MR)  
 1362  
 Marshall (RT)  
 1313  
 Martin (JW)  
 1322  
 Masuda (Y)  
 1298  
 Mathur (BN)  
 1351  
 Matsuura (M)  
 1236  
 Matta (H)  
 1223  
 McClane (BA)  
 1220  
 McClements (DJ)  
 1358  
 McDonough (C)  
 1245  
 McGaw (BA)  
 1394  
 McKeith (FK)  
 1307  
 Mead (R)  
 1380  
 Means (WJ)  
 1306  
 Medina (I)  
 1338  
 Medina (JDLC)  
 1248  
 Melton (SL)  
 1347  
 Mendez (E)  
 1342

Meredith (FI)  
 1276  
 Meyers (SP)  
 1334  
 Min (DB)  
 1373  
 Mistry (VV)  
 1302  
 Mitsumori (K)  
 1397  
 Miyazawa (T)  
 1304  
 Molla (AR)  
 1202  
 Mondy (NI)  
 1250  
 Morgan (MRA)  
 1395  
 Morita (H)  
 1290  
 Morr (CV)  
 1294  
 Munshi (CB)  
 1250  
 Murti (TW)  
 1241  
 Myhara (RM)  
 1233  
 Naczki (M)  
 1233  
 Nagaraja (KV)  
 1375  
 Nagegowda (V)  
 1255  
 Nageswara Sarma (P)  
 1369  
 Namiki (K)  
 1365  
 Nani (R)  
 1359  
 Narasinga Rao (BS)  
 1390  
 Narayanan (PV)  
 1206  
 Natesan (kP)  
 1200  
 Naude (R)  
 1317  
 Neelankantan (S)  
 1291  
 Nguyen (TT)  
 1366  
 Nguyen-The (C)  
 1247  
 Nielsen (TJ)  
 1208  
 Nishikawa (A)  
 1397  
 Nortje (G)  
 1317

Nsofor (LM)  
 1240  
 Obata (A)  
 1236  
 Odutuga (AA)  
 1253  
 Ohshima (H)  
 1392  
 Okazaki (T)  
 1251  
 Okubo (K)  
 1237  
 Olafsson (G)  
 1207  
 Osorio (A)  
 1321  
 Oste (RE)  
 1207 1208  
 Ouali (A)  
 1314  
 Panda (B)  
 1325  
 Pandhi (DP)  
 1265  
 Paraf (A)  
 1393  
 Park (J)  
 1308 1309  
 Park (PSW)  
 1372  
 Pascat (B)  
 1222  
 Patel (MS)  
 1280  
 Pazo (G)  
 1342  
 Penfield (MP)  
 1232  
 Pensabene (JW)  
 1323  
 Perez-Martin (R)  
 1338  
 Perry (AK)  
 1256  
 Petersen (A)  
 1303  
 Pino (JA)  
 1377  
 Pinthus (EJ)  
 1371  
 Poernomo (A)  
 1337  
 Polara (JV)  
 1280  
 Pons (M)  
 1355  
 Poonam Aggarwal  
 1254  
 Porretta (S)  
 1259



Porter (PJ)  
1344  
Povey (MJW)  
1358  
Prahlad (SN)  
1262  
Prakash (V)  
1235  
Prasad Raju (N)  
1369  
Prescott (J)  
1346  
Pritchett Mangan (PA)  
1381  
Pruthi (JS)  
1272  
Puchades (R)  
1286  
Pugalendi (KV)  
1386  
Raats (MM)  
1287  
Rahman (MS)  
1204  
Rajarathnam (S)  
1221  
Rajendran (S)  
1235  
Raksakulthai (N)  
1350  
Ram Gopal  
1324  
Rama Rao (SN)  
1375  
Ramakrishnan (S)  
1386  
Ramana (SV)  
1246  
Rangarao (GCP)  
1209  
Ranote (PS)  
1363 1364  
Rao (MA)  
1379  
Regenstein (JM)  
1330 1332 1343  
Reppond (KD)  
1336  
Resurreccion (AVA)  
1357  
Rhee (HS)  
1374  
Rhee (KC)  
1308 1309  
Rhee (KS)  
1308 1309  
Robertson (JA)  
1276  
Rogers (RW)  
1322

Rooney (LW)  
1245  
Roos (O)  
1321  
Rouseff (RL)  
1353  
Rowland (IR)  
1391  
Saca (SA)  
1269  
Sachdev (AK)  
1324  
Saguy (IS)  
1371  
Saini (SP)  
1254  
Saini (SPS)  
1277 1363 1364  
Sajid Husain  
1369  
Samarajeewa (U)  
1389  
Sanchez (R)  
1377  
Sangeeta Kaul  
1384  
Sankat (CK)  
1270  
Sannabhadti (SS)  
1295 1296  
Santa-Maria (G)  
1368  
Sapru (V)  
1217  
Sarkar (B)  
1197  
Sarkar (SP)  
1295 1296  
Sarma (SC)  
1211  
Sastry (GSR)  
1369  
Satija (V)  
1242  
Sato (M)  
1397  
Savello (PA)  
1301  
Schaefer (DM)  
1310  
Schdatter (J)  
1398  
Scheller (KK)  
1310  
Schleusener (DS)  
1316  
Schmidt (SJ)  
1210 1256  
Scholtz (E)  
1317

Schwenke (JR)  
1316  
Scott (DN)  
1345  
Sekhon (BS)  
1242  
Shah (KK)  
1212  
Shahidi (F)  
1233  
Shashirekha (MN)  
1221  
Sheen (S)  
1212  
Shepherd (R)  
1287  
Shewfelt (RL)  
1340  
Shichino (Y)  
1392  
Sim (JS)  
1329  
Sims (CA)  
1362  
Singh (A)  
1223  
Singh (B)  
1230 1328  
Singh (H)  
1319  
Singh (R)  
1242  
Singh (S)  
1292  
Singh (U)  
1230  
Smerage (GH)  
1217  
Sood (SM)  
1242  
Stauffer (CE)  
1282  
Stephenson (GR)  
1360  
Stevenson (MH)  
1203  
Sun (X)  
1210  
Sundaram (RNS)  
1318  
Suparno  
1337  
Susha (C)  
1382  
Suzuki (K)  
1251  
Swallow (AJ)  
1327  
Swami (GYSK)  
1369

Sweet (SS)  
1257  
Sylianco-Wu (L)  
1388  
Takahashi (M)  
1397  
Takahashi (T)  
1234  
Tatemotsu (M)  
1392  
Taylor (AJ)  
1246  
Teixeira (AA)  
1217  
Tejada (M)  
1349  
Testin (RF)  
1352  
Thakur (S)  
1264  
Thapa (TB)  
1293  
Thed (ST)  
1340  
Tong (CH)  
1212  
Torres (JA)  
1335  
Torres (V)  
1378  
Toyoda (K)  
1397  
Trehan (PK)  
1328  
Trivedi (AB)  
1396

Trivino (I)  
1321  
Uchida (T)  
1237  
Udo (HB)  
1258  
Ugajin (I)  
1298  
Usha Rani (M)  
1375  
Uzawa (M)  
1298  
Van Buren (JP)  
1379  
Varogaux (P)  
1222  
Vattan (T)  
1376  
Venugopal Rao (A)  
1386  
Verma (SS)  
1324  
Waliszweski (KN)  
1248  
Wani (MA)  
1277  
Waniska (RD)  
1245  
Weinberg (P)  
1371  
Weller (CL)  
1352  
Wellington (MA)  
1253  
Wesslen (B)  
1207

Wilkinson (CPD)  
1249  
Willemot (C)  
1278  
Williams (SN)  
1310  
Wilson (JL)  
1347  
Withy (LM)  
1366  
Wong (RJ)  
1345  
Wright (CJ)  
1246  
Wrolstad (RE)  
1366  
Wurgler (FE)  
1398  
Wurm (CM)  
1250  
Xiong (YL)  
1326  
Yanishlieva (NV)  
1370  
Yasui (T)  
1225  
Yeh (A-I)  
1229  
Yost (RA)  
1300  
Yu (SY)  
1348  
Zakia Bano  
1221



# SUBJECT INDEX

## Acetic acid

polyethylene layers/Al foil,  
acetic acid & detn. of 1207

## Acidification

milk, glucono- $\delta$ -lactone &  
acidification of 1289

## Aflatoxins

nutmegs, aflatoxin contamination  
analysis TLC spots interference  
in 1234

## Alaska Pollock

frankfurters,  
N-nitrosodimethylamine formation  
in fish-meat 1323

## Albacore

fatty acid composition analysis  
methylation in albacore lipid  
1338

## Alcohol

black pepper oil, alcohol  
deterpenation of 1377

## Aldehydes

loss of volatile lipid aldehydes  
1372

## Aluminium foil

acetic acid & detn. of Al foils  
1207

## Amaranthus

betacyanin synthesis in  
Amaranthus caudatus 1257

## Amino acids

fish sauces, amino acid concn. &  
flavour of 1350  
ice creams, amino acids of  
commercial vanilla 1298

## Anthocyanins

raspberry juice concentrates,  
anthocyanin content of stored  
1366

## Antibodies

food proteins, monoclonal  
antibodies & analysis of 1393

## Antimutagenicity

cultured milk antimutagenicity  
against  
N-methyl-N'-nitro-N-  
-nitrosoguanidine 1290

## Antioxidants

broiler chicken meats, dietary  
antioxidant & chemical  
properties of fatty acid  
enriched 1329  
catfish muscle microsomes,  
antioxidants & lipid  
peroxidation of 1339

## Apple juices

maturity/fruit ripening &

chemical/sensory properties of  
apple juices 1361

## Arachidonic acid

genotoxins, arachidonic acid &  
hepatic activation of dietary  
1391

## Aroma compounds

LDPE, aroma compounds absorp-  
tion  
into 1208

## Ascorbate

catfish, ascorbate absorption by  
live 1340

## Ascorbic acid

broccoli, packaging modified atm.  
& ascorbic acid in 1256

## Aspergillus niger

soy saponins, Asp. niger effect  
on 1237

## Azadirachtin

Trogoderma granarium,  
azadirachtin & vitellogenic  
oocyte development in 1382

## Bacillus stearothermophilus

sterilization temp. & spores of  
B. stearothermophilus 1217

## Bacillus thuringiensis

crystal protein insecticidal  
production in B. thuringiensis  
1383

## Bacon

nonane in irradiated bacon 1319

## Bacteria

beef carcass tissue, washing &  
bacterial penetration into 1313

## Bakeries

SISI & bakery industry 1283  
baking industry 1283  
fats-bakeries 1283  
problems of Indian baking  
industries 1283

## Bakery products

diversification of bakery  
products in small scale sector  
1283  
marketing of bakery products 1283  
nutritive value of bakery  
products 1283  
quality standards of bakery  
products 1283  
sensory evaluation in baked goods  
1282  
texture of baked goods 1282  
varieties in bakery products 1283

## Baking

developments in baking  
technology, book 1283  
emulsifiers in baking 1282

technology, advances in baking,  
book 1282  
wheat disease & baking quality  
1283

## Bambara groundnuts

soil moisture & comp. of bambara  
groundnut 1231

## Bananas

puffing of bananas 1269  
temp. & ripening behaviour of  
'Senorita' bananas 1268

## Beef

blends, high-protein texturized  
products of defatted soy  
flour/corn starch/beef 1309  
carcass tissue, washing &  
bacterial penetration into  
post-rigor beef 1313  
cooking temp. DSC of beef 1305  
extrusion single-screw of  
defatted soyflour/corn  
starch/beef blends 1308  
muscle, osmotic pressure DSC of  
beef 1314  
muscles, carnosine in beef 1306  
patties, fat level/freezing temp.  
& properties of beef 1311  
steaks, heating & texture of  
packaged pasteurized beef lion  
1307  
tissue, menstrua contamination of  
beef 1312

## Beer

bitterness in beer 1353  
ethanol differential-pulse  
polarographic microdetn. &  
analysis of beer 1354

## Betacyanin

Amaranthus caudatus, betacyanin  
synthesis in 1257

## Beverages

bitterness in beverages 1353  
kinnow-citrus reticulata RTS  
beverages, thermal process for  
1363  
nisin & shelf-life of alcoholic  
beverages 1223

## Blacetyl

wine distillates, blacetyl  
spectrophotometric detn. in 1356

## Bifidobacterium

yoghurt-type products,  
bifidobacterium ssp. & bacterial  
growth/volatile compounds in soy  
milk based 1241

## Bioavailability

nutrient bioavailability assay

- using /sup 13/C labelled substrates 1394
- Bioprocesses**
  - infant formulas, bioprocesses & protective factors amelioration in 1351
- Biotechnology**
  - Cheddar cheese, biotechnology & accelerated ripening of 1292
  - poultry processing & biotechnology 1324
- Bitterness**
  - foods/beverages, bitterness in 1353
- Bread**
  - baking technology & rye bread 1282
  - baking technology & wholemeal bread 1282
  - processing, trends in bread 1283
  - production, machinery for bread 1283
- Broccoli**
  - packaging modified atm. & quality of broccoli 1256
- Broilers**
  - chicken meats, dietary antioxidant/storage & chemical properties of fatty acid enriched broiler 1329
  - plumage colours & body wt./abdominal fat/carcass characters in broilers 1328
- Browning**
  - dairy products, browning characteristics of 1284
- Butterfat**
  - whey protein gels, emulsified butterfat & properties of acidic 1300
- By-products**
  - crab by-products, development/sensory evaluation of minced meat crabcake from blue 1334
  - flour milling industry by-products 1283
- Calcium**
  - milk, Ca spectrophotometric detn. in 1286
- Calibration**
  - reference materials for calibrating probes 1212
- Calorimetry**
  - beef, cooking temp. DSC of 1305
- Carambola**
  - packaging/refrigeration & shelf-life of carambola 1270
- Carbamates**
  - potatoes, moisture/dry heat & carbamate residue reduction in 1250
- Carcasses**
  - broilers, plumage colours & carcass characters in 1328
- Carcinogenicity**
  - ferric chloride carcinogenicity in rats 1397
- Carnobacterium piscicola**
  - Listeria monocytogenes, Carnobacterium piscicola & control of 1219
  - Listeria monocytogenes, temp. & Carnobacterium piscicola activity against 1218
- Carnosine**
  - beef muscles, carnosine in 1306
- Carrots**
  - ready-to-use carrots, yeast spoilage in 1247
  - tissues, cooking & firmness measurement in carrot 1246
- Cassava flour**
  - hydrolysis-enzymatic of cassava flour 1248
- Catalase**
  - shrimp, catalase sol. & microbial spoilage control in 1335
- Catfish**
  - ascorbate absorption by live catfish 1340
  - muscle microsomes, antioxidants/activators/ /inhibitors & lipid peroxidation 1339
  - muscles, lipid extraction solvent systems from catfish 1341
- Cheddar cheese**
  - biotechnology & accelerated ripening of Cheddar cheese 1292
- Cheese**
  - nisin & shelf-life of cheese 1223
  - shelf-life improvement/safety of cheese 1291
  - whey protein concentrates & sensory/rheological characteristics of stored cheese 1293
- Chemistry**
  - flavour chemistry 1213
- Chick peas**
  - processing & nutritional value of chick peas 1230
- Chickens**
  - broiler chicken meats, dietary antioxidant/storage & chemical properties of fatty acid enriched 1329
  - free radicals yield in irradiated chicken bones 1327
  - myofibrillar protein-polysaccharide composite gels, viscoelastic properties of 1326
- Chips**
  - tortilla chips, microstructure electron microscopic evaluation during deep-fat frying of 1245
- Chlorides**
  - milk, chloride spectrophotometric detn. in 1286
- Cholesterol**
  - dietary protein & cholesterol metabolism in small intestines 1386
  - egg powder, cholesterol oxides in irradiated spray-dried 1331
- Chromobacterium violaceum**
  - metmyoglobin conversion to myoglobin by Ch. violaceum 1216
- Ciders**
  - bitterness in fermented apple ciders 1353
- Citrinin**
  - toxic compounds formation during heating of citrinin 1396
- Citrus juices**
  - flavanones GC-MS characterization in citrus juices 1360
  - limonoids in citrus juices 1353
- Citrus reticulata**
  - see Mandarin
- Clarification**
  - plum pulps, enzymatic clarification of 1277
- Closteridium perfringens**
  - enterotoxins 1220
- Coconut oils**
  - stationary phases for GLC, coconut oil as 1369
- Coffee**
  - bitterness in coffee 1353
  - whitener, sensory evaluation/optimization of peanut milk-based liquid coffee 1357
- Colour**
  - pork roasts, temp. & pink coloration pigments in 1315
- Conditioning**
  - wheat conditioning 1226
- Contamination**
  - beef tissue, menstrua contamination of 1312
- Cooking**
  - beef patties, fat level freezing temp. & cooking properties of 1311
  - beef, cooking temp. DSC of 1305



- carrot tissues, cooking & firmness measurement in 1246  
hake roe, cooking & lipids in 1342
- Corn starch**  
blends, extrusion of defatted soy flour/corn starch/beef 1308  
blends, high-protein texturized products of defatted soy flour/corn starch/beef 1309  
rice cake, waxy maize starch adulteration detection in 1225
- Crabs**  
minced meat crab cake from blue crab by-products, development/sensory evaluation of 1334
- Cracker**  
fish cracker manufacture, tapioca starch for 1348
- Cream**  
whipped cream, staining method & microstructure of 1294
- Ctenopharyngodon idella**  
see white amur
- Cultured milks**  
shelf-life improvement/safety of cultured milks 1291
- Dahl**  
misti dahl thermization & acid producers count 1295  
misti dahl thermization & shelf-life/ $\beta$ -D-galactosidase activity 1296  
shelf-life improvement/safety of dahl 1291
- Dairies**  
heat exchangers for dairies 1211
- Dairy products**  
bitterness in dairy products 1353  
browning characteristics of dairy products 1284
- Dehydration**  
foods, osmotic dehydration kinetics of 1204
- Dietary fibers**  
baking & dietary fibers 1282
- Differential scanning calorimetry**  
beef muscle, osmotic pressure DSC of 1314
- Diacylglycerol**  
meat products, diacylglycerol migration into ground 1320
- Diphenolase**  
yam tubers, storage & o-diphenolase of 1253
- Docosahexaenoic acid**  
genotoxins, docosahexaenoic acid & hepatic activation of dietary 1391
- Dough**  
enzymes, dough improvers 1282  
frozen dough production 1282  
rheology of dough 1282
- Drying**  
Fick's second law & osmotic dehydration 1205  
fruit juices, serum viscosity & vacuum belt drying of 1359  
potato slices, process variables & drying of 1249
- Egg powder**  
cholesterol oxides in irradiated spray-dried egg powder 1331
- Egg white**  
gels, failure deformation/stress relaxation of heated egg white 1332
- Eicosapentaenoic acid**  
genotoxins, eicosapentaenoic acid & hepatic activation of dietary 1391
- Electron microscopy**  
whipped cream, staining method & microstructure of 1294
- Ellagic acid**  
grape juices, ellagic acid precipitation in stored muscadine 1362
- Emulsifiers**  
Listeria monocytogenes, emulsifiers & nisin inhibition of 1288
- Enterotoxins**  
Clostridium perfringens enterotoxins 1220
- Enzymes**  
broccoli, packaging modified atm. & enzymic activity in 1256  
dough improvers & enzymes 1282  
plum pulps, enzymatic clarification of 1277
- Epicatechin**  
tea, epicatechin of Sikkim 1367
- Equipments**  
bread production, equipments for 1283  
dairies, heat exchangers for 1211
- Export**  
fruit/vegetables, export of 1261
- Extraction**  
carnosine extraction from beef muscle 1306  
catfish muscles, lipid extraction solvent systems from 1341  
fats, extraction supercritical CO<sub>2</sub> of vegetable/animal 1368
- Extruder**  
soy extrudates, extruder-twin screw & texture evaluation of dehulled whole soybean 1238  
wheat flour, extruder-twin screw & extrusion cooking of 1229
- Extrusion**  
bakery products, extrusion in 1282  
blends, extrusion single-screw of defatted soy flour/corn starch/beef 1308  
wheat flour, extruder-twin screw & extrusion cooking of 1229
- Fats**  
bakery fats 1283  
substitute for fats 1282
- Fats animal**  
beef patties, fat level & properties of 1311  
broilers, plumage colours & abdominal fat in 1328  
extraction supercritical CO<sub>2</sub> of animal fats 1368  
frankfurters, cure level/processing method/meat source & production of low-fat 1322
- Fats milk**  
Listeria monocytogenes, fats & nisin inhibition of 1288  
milk, fats & free-choice profiling of 1287
- Fats vegetables**  
extraction supercritical CO<sub>2</sub> of vegetable fats 1368
- Fatty acid**  
albacore lipid, fatty acid composition analysis methylation in 1338
- Fatty acids**  
broiler chicken meats, dietary antioxidant/storage & chemical properties of fatty acid-enriched 1329  
genotoxins, fatty acids & hepatic activation of dietary 1391  
tea, fatty acid composition of Sikkim 1367  
white amur, diets & fatty acids of 1347
- Fermentation**  
raddish kimchi, fermentation & pungency in 1374
- Fermented foods**  
milk products, shelf-life improvement/safety of fermented 1291
- Ferric chloride**  
rats, ferric chloride carcinogenicity in 1397
- Ferulic acid**  
lipid autooxidation, temp. & ferulic acid inhibition of 1370

- Firmness**  
carrot tissues, cooking & firmness measurement in 1246
- Fish**  
lipid hydroperoxides fluorometric peroxygenase assay in fish 1304  
minces, foaming capacity of frozen stored fish 1349  
smooth oreodory, cold storage & spoilage of 1345  
waste utilization in Indonesia 1337
- Fish products**  
sauces, peptides/amino acids & flavour of fish 1350
- Flavanones**  
citrus/grape juices, flavanones GC-MS characterization in 1360
- Flavour**  
chemistry-flavour 1213  
fish sauces, peptides/amino acids & flavour of 1350
- Flounder**  
protease inhibitors & physical properties of arrowtooth flounder 1336
- Flour**  
by-products of flour milling industry 1283  
commercial flour & additives 1283
- Fluorometry**  
meat/fish, lipid hydroperoxides fluorometric peroxygenase assay in 1304
- Foaming**  
fish minces foaming capacity of frozen stored 1349
- Frankfurters**  
cure level/processing method/meat source & production of low-fat frankfurters 1322  
fish-meat frankfurters, N-nitrosodimethylamine formation in 1323
- Freezing**  
beef patties, freezing temp. & properties of 1311
- Frozen foods**  
dough-frozen production 1282
- Fructose**  
dispersions, temp./aging & rheological changes during gelation of fructose 1379
- Fruit juices**  
serum viscosity/pulp content & drying of fruit juices 1359  
sugar content analysis ultrasonic of fruit juices 1358
- Fruits**  
Indian fruit processing industries 1260  
development of fruit processing industries 1261  
emerging trends in fruit processing industries 1262  
glutamic acid in Philippine fruits 1267  
nisin & shelf-life of fruits 1223  
processing industries, Himachal Pradesh 1264  
processing industries, growth of fruit 1265 1266  
processing units-Rajasthan 1263
- Frying**  
oil uptake, frying deep-fat & criterion for 1371  
tortilla chips, microstructure electron microscopic evaluation during deep-fat frying 1245
- Galactosidases**  
misti dahi thermization &  $\beta$ -D-galactosidase activity 1296
- Gas chromatography**  
citrus/grape juices, flavanones GC-MS characterization in 1360
- Gels**  
egg white gels, failure deformation/stress relaxation of heated 1332  
temp. mapping magnetic resonance imaging in food gel 1210  
whey protein gels, emulsified butterfat & properties of acidic 1300
- Genotoxicity**  
sorbates, genotoxicity of 1398  
vitamin B<sub>6</sub>, antigenotoxic effects of 1388
- Ghee**  
sensory qualities of curdled milk ghee 1297
- Globulins**  
sesame seed, alkaline sol. &  $\beta$ -globulin stability in 1235
- Glucose oxidase**  
shrimp, glucose oxidase sol. & microbial spoilage control in 1335
- Glucosidases**  
soybeans,  $\beta$ -glucosidase from 1236
- Glutamic acid**  
fruit/vegetables, glutamic acid in 1267
- Gluten**  
wheat gluten film, water/glycerol & mechanical/water vapour barrier properties of edible 1227  
wheat gluten films, temp. & O<sub>2</sub> permeability of edible 1352
- Grape juices**  
ellagic acid precipitation in stored Muscadine grape juices 1362  
flavanones GC-MS characterization in grape juices 1360
- Green beans**  
Phaseolus vulgaris cvs, texture preference & sensory evaluation of 1232
- Groundnuts**  
coffee whitener, sensory evaluation/optimization of peanut milk-based liquid 1357
- Guava**  
nectar, production of clear guava 1271
- Hakes**  
roe, cooking & lipids in hake 1342
- Ham**  
nitroso compounds mutagenicity in Chilean ham 1321
- Handling**  
wheat, handling of 1283
- Heat**  
potatoes, dry heat & carbamate residue reduction in 1250
- Heat exchangers**  
dairies, heat exchangers for 1211
- Heating**  
beef lion steaks, heating & texture of packaged pasteurized 1307  
citrinin, toxic compounds formation during heating of 1396
- Hickory**  
pyloric glands development in rats, hickory-smoke condensate effect on pepsinogen 1-altered 1392
- Hydration**  
soy protein isolate, hydration of heat-treated 1243
- Hydrolysis**  
cassava flour, hydrolysis-enzymatic of 1248  
mackerel mince lipid hydrolysis 1343
- Ice creams**  
amino acids of commercial vanilla ice creams 1298
- Industries**  
food processing industries, growth of 1197 1198 1199 1200 1201 1202  
fruit/vegetable processing industries 1260  
fruit/vegetable processing



- industries, emerging trends in 1262
- Infant foods**  
bioprocesses & protective factors amelioration in infant formulas 1351
- Irradiation**  
bacon, nonane in irradiated 1319  
chicken bones, free radicals yield in irradiated 1327  
egg powder, cholesterol oxides in irradiated spray-dried 1331  
identification of irradiated foods 1203  
strawberries,  $\gamma$ -radiation & cell wall comp. of 1278
- Isopropyl N-(3-chlorophenyl) carbamates**  
potatoes, moist/dry heat & carbamate residue reduction in 1250
- Kefir**  
shelf-life improvement/safety of kefir 1291
- Keropok**  
see Cracker
- Khoa**  
flexible packages OTR during storage of khoa 1299
- Kumiss**  
shelf-life improvement/safety of kumiss 1291
- Kurthia**  
metmyoglobin conversion to myoglobin by Kurthia 1216
- LDPE**  
aroma compounds absorption into LDPE 1208
- Lactobacillus fermentum**  
metmyoglobin conversion to myoglobin by Lact. fermentum 1216
- Lactones**  
milk, glucono- $\delta$ -lactone & acidification of 1289
- Lassi**  
shelf-life improvement/safety of lassi 1291
- Leben**  
shelf-life improvement/safety of leben 1291
- Lecithin**  
bakery products, lecithin in 1282
- Legumes**  
protein meals, processing & oligosaccharides of legume 1233
- Lemon juices**  
N-nitrosomorpholine formation by lemon juices 1365
- Limonoid**  
citrus juices, limonoids in 1353
- Lipids**  
aldehydes, loss of volatile lipid 1372  
autoxidation, temp. & tocopherol/ferulic acid inhibition of lipid 1370  
catfish muscle microsomes, antioxidants/activators/ inhibitors & lipid peroxidation 1339  
catfish muscles, lipid extraction solvent systems from 1341  
hake roe, cooking & lipids in 1342  
mackerel mince lipid hydrolysis, characteristics of 1343  
meat/fish, lipid hydroperoxides fluorometric peroxygenase assay in 1304  
salmon, lipid composition of sockeye 1344  
white amur, diets & lipids of 1347
- Listeria monocytogenes**  
Carnobacterium piscicola & control of L. monocytogenes 1219  
fat/emulsifiers & nisin inhibition of L. monocytogenes 1288  
temp. Carnobacterium piscicola activity against L. monocytogenes 1218
- Mackerels**  
characteristics of mackerel mince lipid hydrolysis 1343
- Mandarin**  
kinnow-Citrus reticulata RTS beverages, thermal process for 1363
- Mandarin juices**  
shelf-life of processed Kinnow juices 1364
- Mangoes**  
industry, mango processing in 1273  
ripening in wax-coated Bocado mangoes 1274  
technology for mango processing 1272  
vitamin A & mango consumption 1387
- Marketing**  
broccoli, packaging modified atm. & marketing quality of 1256
- Mass spectroscopy**  
citrus/grape juices, flavanones GC-MS characterization in 1360
- Maturity**  
apple juices, maturity & chemical/sensory properties of 1361  
peaches, maturity & sensory analysis of CV cresthaven 1276
- Meat**  
cured meat, rubber nettings & N-nitrosodibutylamine/ nitrosamines in packed 1303  
frankfurters, meat source & production of low-fat 1322  
lipid hydroperoxides fluorometric peroxygenase assay in meat 1304  
nisin & shelf-life of meat 1223  
trace metals in Sri Lankan animal foods 1389
- Meat products**  
plasticizers migration into ground meat products 1320
- Mechanical properties**  
wheat gluten film, water/glycerol & mechanical properties of edible 1227  
whey protein films, mechanical properties/water vapour transferability through 1301
- Metals**  
foods, trace metals in Sri Lankan animal 1389
- Metmyoglobin**  
bacteria, metmyoglobin conversion to myoglobin by 1216
- Microorganisms**  
shrimp, glucose oxidase sol. & microbial spoilage control in 1335
- Microstructure**  
tortilla chips, microstructure electron microscopic evaluation during deep-fat frying of 1245  
whipped cream, staining method & microstructure of 1294
- Microwaves**  
baking, microwave technology in 1282
- Milk**  
Ca/phosphate/chloride spectrophotometric detn. in milk 1286  
free-choice profiling of milk 1287  
glucono- $\delta$ -lactone & acidification of milk 1289  
nisin & shelf-life of milk 1223  
sensory analysis terminology for fluid milk 1285
- Milk products**  
fermented milk products, shelf-life improvement/safety of 1291  
nisin & shelf-life of milk products 1223
- Milk protein**  
yoghurt, manufacture of high milk protein powder based non-fat 1302

- Milling**  
by-products of flour milling industry 1283  
developments in milling technology, book 1283  
rice, milling characteristics of parboiled/milled 1224  
wheat disease & milling quality 1283
- Misti dahl**  
see Dahl
- Moisture**  
low-moisture solids, pH of 1214  
potatoes, moist heat & carbamate residue reduction in 1250
- Mung beans**  
processing & nutritional value of mung beans 1230
- Mushroom**  
1221  
storage controlled atm. of mushroom 1222  
toxins in mushrooms 1399
- Mutagenicity**  
ham/sausages, nitroso compounds mutagenicity in chilean 1321
- Myoglobin**  
bacteria, metmyoglobin conversion to myoglobin by 1216
- Nectarines**  
storage controlled atm. & physiological disorders in nectarines 1275
- Nisin**  
Listeria monocytogenes, fat/emulsifiers & nisin inhibition of 1288  
foods, nisin & shelf-life of, review 1223
- Nitrosamines**  
meat, rubber nettings & nitrosamines in packed cured 1303
- Nitrosodibutylamines**  
meat, rubber nettings & N-nitrosodibutylamines in packed cured 1303
- Nitrosodimethyl amines**  
frankfurters, N-nitrosodimethylamine formation in fish-meat 1323
- Nitrosoguanidine**  
cultured milk antimutagenicity against N-methyl-N'-nitro-N-nitrosoguanidine 1290
- Nitrosomorpholine**  
lemon juices, N-nitrosomorpholine formation by 1365
- Nonane**  
bacon, nonane in irradiated 1319
- Nucleotides**  
retinol deficient albino rats, S'-nucleotidase activity in 1384
- Nutmeg**  
aflatoxin contamination analysis TLC spots interference in nutmeg 1234
- Nutrients**  
/sup 13/C labelled substrates, nutrient bioavailability assay using 1394  
food processing, nutrients during 1390
- Nutrition**  
proceedings of Nutrition Society of India 1387
- Nutritional values**  
legumes, processing & nutritional values of 1230  
palm oils, nutritional value of 1387
- Oils**  
frying deep-fat & criterion for oil uptake 1371
- Oilseeds**  
protein meals, processing & oligosaccharides of oilseed 1233
- Oligosaccharides**  
oilseed protein meals, processing & oligosaccharides of 1233
- Olives**  
pH & oxidation process for olives 1376
- Osmosis**  
beef muscle, osmotic pressure DSC of 1314  
Fick's second law & osmotic dehydration 1205  
foods, osmotic dehydration kinetics of 1204
- Oxidation**  
lipid autoxidation, temp. & tocopherol/ferulic acid inhibition of 1370  
olives, pH & oxidation process for 1376  
soybean oils, tocopherol & oxidative stability of 1373
- Packaging**  
carambola, packaging & shelf-life of 1270  
pork retail cuts, centralized bulk prepackaging of 1317  
trends in Indian food packaging 1206
- Packaging materials**  
khoa, flexible package OTR during storage of 1299
- Packaging modified atmosphere**  
broccoli, packaging modified atm. & quality of 1256
- Pagrus auratus**  
see Snapper
- Palm**  
hearts, evaluation of palm 1378
- Palm oils**  
nutritional effects of palm oils 1387
- Parboiling**  
rice, milling characteristics of parboiled 1224
- Peaches**  
maturity/ripening/storage & sensory analysis of CV cresthaven peaches 1276
- Pectins**  
temp./aging & rheological changes during gelation of high-methoxyl pectin 1379
- Pepper**  
oil, alcohol deterpenation of black pepper 1377
- Peptides**  
fish sauces, peptides concn. & flavour of 1350
- Peroxidases**  
yam tubers, storage & peroxidase activities of 1253
- Peroxygenase**  
meat/fish, lipid hydroperoxides fluorometric peroxygenase assay in 1304
- Pests**  
wheat, protein quality of insect infested 1228
- Phenols**  
wines, ethylphenols in 1355  
yam tubers, storage & phenolic content of 1253
- Phosphates**  
milk, phosphates spectrophotometric detn. in 1286
- Phospholipids**  
bakery products, phospholipids in 1282
- Physical properties**  
fish, protease inhibitors & physical properties of 1336
- Pickles**  
quality standards of Indian commercial pickles 1375
- Pigeon peas**  
processing & nutritional value of pigeon peas 1230
- Plastics**  
retortable plastic packaging for thermo-processed foods 1209
- Plums**  
enzymatic clarification of plum pulps 1277



## **Polarography**

beer, ethanol differential-pulse  
polarographic microdetn. &  
analysis of 1354

## **Pollock**

surimi, protease inhibitors &  
physical properties of Wallyee  
pollock 1336

## **Polyethylene**

acetic acid & detn. of  
polyethylene layers 1207

## **Pork**

cuts, centralized bulk  
pre-packaging of pork retail 1317  
roast, surimi-like pork products  
in restructured precooked pork  
1316  
roasts, temp. & pink coloration  
pigments in pork 1315

## **Potato starch**

soy blends-potato starch 1239

## **Potatoes**

moisture/dry heat & carbamate  
residue reduction in potatoes  
1250  
slices, process variables &  
drying of potato slices 1249  
temp. & salt diffusion in potato  
1252  
thermal processing & softening of  
potatoes 1251

## **Poultry**

biotechnology & poultry  
processing 1324

## **Processing**

food processing industries,  
growth of 1197 1198 1199 1200  
1201 1202  
food processing, nutrients during  
1390  
frankfurters, processing method &  
production of low-fat 1322  
fruit/vegetable processing  
industries in Himachal Pradesh  
1264  
fruit/vegetable processing  
industries, emerging trends in  
1262  
fruit/vegetable processing  
industries, growth of 1265 1266  
fruit/vegetable processing  
industries-Indian 1260  
fruit/vegetable processing units  
in Rajasthan 1263  
mango processing in industry 1273  
seafood processing plants,  
effluent water treatment  
economic/efficient method for  
1333  
spent hens, processing of 1325

## **Proteases**

fish, protease inhibitors &  
physical properties of 1336

## **Protein foods**

blends, high protein texturized  
products of defatted soy  
flour/corn starch/beef 1309

## **Proteins**

dietary protein & cholesterol  
metabolism in small intestines  
1386  
food proteins, monoclonal  
antibodies & analysis of 1393  
fortified foods, protein-binding  
assay for vitamin B<sub>12</sub> in  
1395

## **Proteins animal**

egg proteins, gel point of 1330  
myofibrillar  
protein-polysaccharide composite  
gels, viscoelastic properties of  
1326

## **Proteins cereal**

wheat, protein quality of insect  
infested 1228

## **Proteins milk**

whay protein gels, emulsified  
butterfat & properties of acidic  
1300  
whay proteins, gel point of 1330

## **Puffing**

bananas, explosion puffing of 1269

## **Pulps**

fruit juices, pulp content &  
vacuum belt drying of 1359  
plum pulps, enzymatic  
clarification of 1277

## **Pumpkin**

*Telfaria occidentalis* fruit,  
pod/pulp of fluted 1258

## **Pungency**

radish kimchi, fermentation &  
pungency in 1374

## **Quality**

broccoli, packaging modified atm.  
& quality of 1256  
pickles, quality standards of  
Indian commercial 1375  
rabbit meat, tropical coastal  
condition & quality of 1318  
sugarcane juices,  
location/variety & quality of  
1280

## **Rabbits**

meat, tropical coastal condition  
& quality of rabbit 1318

## **Radish**

kimchi, fermentation & pungency  
in radish 1374

## **Ragi**

response/lipemic index of ragi  
diet 1385

## **Raspberry juice concentrates**

anthocyanin content of stored red  
raspberry juice concentrates 1366

## **Ready-to-eat foods**

sag, retort processing & chemical  
composition/organoleptic quality  
of ready-to-eat 1254

## **Ready-to-serve beverages**

kinnow-citrus reticulata RTS  
beverages, thermal process for  
1363

## **Reference materials**

preparation of food reference  
materials 1215

## **Refrigeration**

*Listeria monocytogenes*,  
refrigeration temp. &  
*Carnobacterium piscicola*  
activity against 1218  
carambola, refrigeration &  
shelf-life of 1270

## **Residues**

potatoes, moist/dry heat &  
carbamate residue reduction in  
1250

## **Restructured foods**

pork roast, surimi-like pork  
products in restructured  
precooked 1316

## **Retinol**

nucleotidase activity in retinol  
deficient albino rats 1384

## **Retort processing**

sag, retort processing & chemical  
comp./organoleptic quality of  
ready-to-eat 1254

## **Rheological properties**

cheese, whey protein concentrates  
& rheological properties of  
stored 1293  
pectin/fructose dispersions,  
temp./aging & rheological  
changes during gelation of high  
methoxyl 1379

## **Rice**

cake, waxy maize starch  
adulteration detection in waxy  
rice 1225  
glycemic response/lipemic index  
of rice diet 1385  
parboiled milled rice, milling  
characteristics of 1224

## **Ripening**

Cheddar cheese, biotechnology &  
accelerated ripening of 1292  
apple juices, fruit ripening &  
chemical/sensory properties of  
1361

- bananas, temp. & ripening behaviour of 'Senorita' 1268
- mangoes, ripening in wax-coated Bocado 1274
- peaches, ripening & sensory analysis of CV cresthaven 1276
- Roasts**
- pork roasts, surimi-like pork products in restructured precooked 1316
- Rye flour**
- baking technology & rye flour 1282
- baking technology & wheat flour 1282
- Safety**
- milk products, safety of fermented 1291
- Sag**
- ready-to-eat sag, retort processing & chemical comp./organoleptic quality of 1254
- Salmon**
- lipid composition of sockeye salmon 1344
- Salt**
- potato, temp. & salt diffusion in 1252
- Saponins**
- soy saponins, *Aspergillus niger* effect on 1237
- Sausages**
- nitroso compounds mutagenicity chilean sausages 1321
- Seafoods**
- processing plants, effluent water treatment economic/efficient method for seafood 1333
- Sensory evaluation**
- coffee whitener, sensory evaluation of peanut milk-based liquid 1357
- crabcake from blue crab by-products, sensory evaluation of minced meat 1334
- green beans, texture preference & sensory evaluation of 1232
- milk, sensory analysis terminology for fluid 1285
- palm hearts, sensory evaluation of 1378
- performance assessment of sensory panelists 1381
- snapper, sensory evaluation of Australian 1346
- statistics & problem of sensory measurement 1380
- Sensory properties**
- apple juices, maturity/fruit ripening & sensory properties of 1361
- beef blends, high-protein texturized products of defatted soy flour/corn starch 1309
- beef patties, fat level/freezing temp. & sensory properties of 1311
- cheese, whey protein concentrates & sensory properties of stored 1293
- ghee, sensory qualities of curdled milk 1297
- white amur, diets & sensory properties of 1347
- Sensory quality**
- sag, retort processing & organoleptic quality of ready-to-eat 1254
- Sesame**
- alkaline sol. &  $\beta$ -globulin stability in sesame seed 1235
- Shelf-life**
- beef blends, shelf-life of defatted soy flour/corn starch 1309
- carambola, packaging/refrigeration & shelf-life of 1270
- foods, nisin & shelf-life of, review 1223
- mandarin juices, shelf-life of processed 1364
- milk products, shelf-life improvement/safety of fermented 1291
- misti dahl thermization & shelf-life 1296
- Shrikhand**
- shelf-life improvement/safety of shrikhand 1291
- Shrimps**
- glucose oxidase/catalase sol. & microbial spoilage control in shrimp 1335
- Smooth oreodory**
- see Fish 1345
- Snacks**
- fish cracker manufacture, tapioca starch for 1348
- Snapper**
- Pagrus auratus*, sensory evaluation of Australian 1346
- Sodium dodecylsulphate**
- soybeans, SDS & 7S fraction of 1242
- Softening**
- potatoes, thermal processing & softening of 1251
- Solvent**
- catfish muscles, lipid extraction solvent systems from 1341
- Sorbates**
- genotoxicity of sorbates 1398
- Soy flour**
- bitter compounds in soy flour 1353
- blends, extrusion of defatted soy flour/corn starch/beef 1308
- blends, high-protein texturized products of defatted soy flour/corn starch/beef 1309
- Soy milk**
- lactobacillus* spp. & bacterial growth/volatile compounds in soy milk based yoghurt-type products 1241
- storage of stabilized soy milk 1240
- Soy products**
- extrudates, extruder-twin screw & texture evaluation of dehulled whole soybean 1238
- potato starch soy blends 1239
- Soy proteins**
- hydration of heat-treated soy protein isolate 1243
- sodium dodecylsulphate & 7S fraction of soybeans 1242
- soybeans & comp./structural characteristics of isolated soy proteins 1244
- Soybean oils**
- stationary phases for GLC, soybean oils as 1369
- tocopherol & oxidative stability of soybean oils 1373
- Soybeans**
- $\beta$ -glucosidase from soybeans 1236
- saponins, *Aspergillus niger* effect on soy 1237
- Spectrophotometry**
- milk, Ca/phosphate/chloride spectrophotometric detn. in 1286
- wine distillates, biacetyl spectrophotometric detn. in 1356
- Spoilage**
- carrots, yeast spoilage in ready-to-use 1247
- shrimp, glucose oxidase/catalase sol. & microbial spoilage control in 1335
- Stability**
- soybean oils, tocopherol & oxidative stability of 1373
- Stabilization**
- soy milk, storage of stabilized 1240
- Standards**
- pickles, quality standards of Indian commercial 1375



**Steers**

tocopherol acetate-dietary & quality of beef 1310

**Sterilization**

*Bacillus stearothermophilus*, sterilization temp. & spores of 1217

**Storage**

broiler chicken meats, storage & chemical properties of fatty acid enriched 1329  
cheese, whey protein concentrates & sensory/rheological properties of stored 1293  
khoa, flexible package OTR during storage of 1299  
soy milk, storage of stabilized 1240

**Storage cereals**

wheat, storage of 1283

**Storage cold**

fish minces, foaming capacity of frozen stored 1349

**Storage controlled atmosphere**

mushroom, storage controlled atm. of 1222  
nectarines, storage controlled atm. & physiological disorders in 1275

**Storage fish**

smooth oreodory, cold storage & spoilage of 1345

**Storage fruits**

grape juices, ellagic acid precipitation in stored 1362  
peaches, storage & sensory analysis of CV cresthaven 1276  
raspberry juice concentrates, anthocyanin content of stored red 1366

**Storage vegetables**

yam tubers, storage & composition of 1253

**Strawberries**

$\gamma$ -radiation & cell wall comp. of strawberries 1278

**Sugar**

effluents, BOD equation constants for sugar mill 1279  
fruit juices, sugar content analysis ultrasonic of 1358  
sugarcane, sugar recovery estimation formula for 1281

**Sugarcane juices**

location/variety & comp./quality of sugarcane juices 1280

**Surimi**

frankfurters, N-nitrosodimethylamine formation in fish-surimi 1323

**Tapioca**

glycemic response/lipemic index of tapioca diet 1385

**Tapioca starch**

fish cracker manufacture, tapioca starch for 1348

**Tea**

epicatechin/fatty acid composition of Sikkim tea 1367

**Technology**

mango processing, technology for 1272

***Telfaria occidentalis***

see Pumpkin

**Terminology**

milk, sensory analysis terminology for fluid 1285

**Texture**

beef lion steaks, heating & texture of 1307  
green beans cvs, texture preference & sensory evaluation of 1232  
soy extrudates, extruder-twin screw & texture evaluation of dehulled whole 1238

**Thermal process**

kinnow-Citrus reticulata RTS beverages, thermal process for 1363

**Thermal processing**

potatoes, thermal processing & softening of 1251

**Thermization**

misti dahl thermization & acid producers count 1295  
misti dahl thermization & shelf-life/ $\beta$ -D-galactosidase activity 1296

**Thermo-processed foods**

retortable plastic packaging for thermo-processed foods 1209

**Tocopherol acetate**

beef, tocopherol acetate & quality of 1310

**Tocopherols**

lipid autoxidation, temp. & tocopherol inhibition of 1370  
soybean oils, tocopherol & oxidative stability of 1373

**Tomatoes**

pulp, ultrafiltration & preparation of tomato 1259

**Tortilla**

chips, microstructure electron microscopic evaluation during deep-fat frying of tortilla 1245

**Toxins**

citrinin, toxic compounds formation during heating of 1396

fatty acids & hepatic activation of dietary genotoxins 1391  
foods, toxic plant constituents in 1399

**Traditional foods**

wheat based traditional foods 1283

***Trogoderma granarium***

azadirachtin & vitellogenic oocyte development in Tr. granarium 1382

**Ultrafiltration**

tomato pulp, ultrafiltration & preparation of 1259

**Ultrasonics**

fruit juices, sugar content analysis ultrasonic of 1358

**Vegetables**

Indian vegetable processing industries 1260  
development of vegetable processing industries 1261  
emerging trends in vegetable processing industries 1262  
glutamic acid in Philippine vegetables 1267  
processing industries, Himachal Pradesh 1264  
processing industries, growth of vegetable 1265 1266  
processing units-Rajasthan 1263  
production of vegetables 1255

**Viscosity**

fruit juices, serum viscosity & drying of 1359  
myofibrillar protein-polysaccharide composite gels, viscoelastic properties of 1326

**Vitamin A**

mango consumption & vitamin A 1387

**Vitamin B**

antigenotoxic effects of B-vitamins 1388

**Vitamin B<sub>12</sub>**

fortified foods, protein-binding assay for vitamin B<sub>12</sub> in 1395

**Volatile compounds**

yoghurt-type products, *blifidobacterium* ssp. & bacterial growth/volatile compounds in soy milk based 1241

**Washing**

beef carcass tissue, washing & bacterial penetration into post-rigor 1313

**Waste water**

sugar mill effluents, BOD equation constants for 1279

**Wastes**

- fish waste utilization in Indonesia 1337
- seafood processing plants, effluent water treatment economic/efficient method for 1333

**Water**

- wheat gluten film, water & mechanical/water vapour barrier properties of 1227

**Wax**

- mangoes, ripening in wax-coated Bocado 1274

**Wheat**

- baking technology & wheat 1282
- conditioning of wheat 1226
- gluten film, water/glycerol & mechanical/water vapour barrier properties of edible wheat 1227
- gluten films, temp. & O<sub>2</sub> permeability of edible wheat 1352

- protein quality of insect infested wheat 1228
- storage/handling of wheat 1283

**Wheat flour**

- baking technology & wheat flour 1282
- extruder-twin screw & extrusion cooking of wheat flour 1229

**Wheat products**

- preservatives & shelf-life of wheat based products 1283

**Whey proteins**

- films, mechanical properties/water vapour transferability/through whey protein 1301

**Wheys**

- gels, emulsified butterfat & properties of acidic whey protein 1300
- proteins, gel point of whey 1330

**White amur**

- Ctenopharyngodon idella*, diets & fatty acids/lipids/sensory properties of 1347

**Wines**

- bitterness in wines 1353
- ethylphenols in wines 1355
- distillates, biacetyl spectrophotometric detn. in wine 1356

**Yam**

- storage & composition of yam tubers 1253

**Yeasts**

- carrots, yeast spoilage in ready-to-use 1247

**Yoghurts**

- manufacture of high milk protein powder based non-fat yoghurt 1302
- shelf-life improvement/safety of yoghurts 1291



2016

Bhullar (AS) and Sohrab. **Quality challenge for India - need for a national focus.** *ISI Bulletin* 7(6); 1993; 176-177, 186

Covers global developments highlighting the lack of a national focus and proposals to rectify the same. GRA

2017

Dou (J), Toma (S) and Nakai (S). **Random-centroid optimization for food formulation.** *Food Research International* 26(1); 1993; 27-37

Random-centroid optimization was modified by introducing a penalty function to accommodate constraints in formula optimization. Quality parameters not significantly different ( $P > 0.05$ ) from those obtained by the Complex (constrained simplex) modified for formulation (Forplex) were computed by this new program and yielded similar ingredient compositions to those computed by Forplex. The new program was similar or more efficient in optimization than Forplex which occasionally stalled during searching for the optimum. It has been found that the new, multifactor program written to accommodate up to 20 factors is appropriate for use in research and development, especially for formulations with constraints, while Forplex is recommended for routine formulation. AA

## FOOD PROCESSING

2018

Lelieveld (HLM), Hugelshofer (W), Jepson (PC), Lalande (M), Mostert (MA), Nassaur (J), Ringstrom (R). **Microbiologically safe continuous pasteurization of liquid foods.** *Trends in Food Science and Technology* 3(11); 1992; 303-307

Summarises the guidelines prepared by the European Hygienic Equipment design groups to minimize the risk and guideline, for producing microbiologically safe continuous pasteurization of liquid foods. GS

2019

Kuchroo (TK). **Food extrusion technology.** *Beverage and Food World* 19(5); 1992; 46

2020

Defence Food Research Laboratory Mysore. **Symposium on Preservation and Supply of Fresh and Processed Foods.** Mysore. 17th - 18th October 1984. Defence Food Research Laboratory, DRDO, Mysore. 1-94; 1984

Covers the abstracts of papers presented at the symposium: microbiological problems of storage and supply of fresh and processed foods by Sreenivasa Murthy, V. (pp. 55, 57); Nutritive value and shelf-life of cereal grains stored in different storage structures by Devadas, R. P., Usha Chandrasekhar, and Sakthivelmani, A. (pp. 59); Microbiological aspects of food preservation of fresh and processed foods by Adinarayanaiah, C. L. and Mathew, T. V. (pp. 59, 61); Scientific basis for considerations on food safety - realities and myths by Krishnaswamy, P. R. (pp. 65); Food safety: regulatory aspects by Kapur, O. P. (pp. 65, 67); Quality control in meat processing by Ambadkar, P. M. (pp. 67, 69); Safety plastics used in food packaging: and overview by Srivastava, R. K. and Kulshreshtha, H. K. (pp. 69, 71); Aseptic processing of fruit pulps and juices by Gupta, T. R. and Ramanathan, P. K. (pp. 75); Nutrient losses in processed, preserved and packaged foods by Vijayaraghavan, P. K. (pp. 77). CSA

## FOOD PACKAGING

2021

Anon. **Packaging - catching up with world standards.** *Beverage and Food World* 19(5); 1992; 62-63

### Packaging materials

2022

Urzendowski (IR) and Pechak (DG). **Characterization of food packaging materials by microscopic, spectrophotometric, thermal and dynamic mechanical analysis.** *Food Structure* 11(4); 1992; 301-314

The compatibility of polyethylene/polypropylene blends was identified by using glassy state relaxations, secondary transitions, heats of fusion,  $\tan \delta$  data and storage modulus data. From the permeability, thermal and microscopic data, saran coated high impact polystyrene cups were found unsuitable for oil based products due to environmental stresses induced in the polystyrene layer. SD

2023

Figge (K) and Hilpert (HA). **Migration of various additives out of polymeric packing material into**

## FOOD ENGINEERING AND EQUIPMENT

2024

Awuah (GB), Ramaswamy (HS) and Simpson (BK). **Surface heat transfer coefficients associated with heating of food particles in CMC solutions.** *Journal of Food Process Engineering* 16(1): 1993: 39-57

Successful temperature prediction for particular foods in viscous fluids (0-1% CMC sol.) requires data on the convective heat transfer coeff. (h<sub>sp</sub>) at the fluid particle interface. Av. h<sub>sp</sub> values ranged from 80-450 w/m<sup>2</sup>C for potatoes and 100-550 w/m<sup>2</sup>C for carrots. Natural convection dominated the flow regime, giving good correlations between Nusselt and Rayleigh numbers. RN

2025

Peleg (M). **Assessment of a semi-empirical four parameter general model for sigmoid moisture sorption isotherms.** *Journal of Food Process Engineering* 6(1): 1993: 21-37

2026

Zhang (Q) and Litchfield (JB). **Fuzzy logic control for a continuous crossflow grain dryer.** *Journal of Food Process Engineering* 16(1): 1993: 59-77

2027

Moreira (RG) and Bakker-Arkema (FW). **Grain dryer controls: A review.** *Cereal Chemistry* 69(4): 1992: 390-396

The technology of in-bin and continuous-flow grain dryer controllers was assessed. In-bin controls are usually of the heuristic type. Control for continuous-flow grain dryers is of either the classical feedback or the adaptive feedforward type. Moisture-based control is recommended for large variations in moisture content. Several commercial controllers were evaluated. It was concluded that controllers have finite grain-quality and cost advantages when installed on in-bin and continuous-flow systems. AA

## ENERGY IN FOOD PROCESSING

Nil

## FOOD CHEMISTRY AND ANALYSIS

## Chemistry

2028

Hwang (J), Pyun (YR) and Kokini (JL). **Side chains of pectins: Some thoughts on their role in plant cell walls and foods.** *Food Hydrocolloids* 7(1): 1993: 39-53

This article reviews the characteristics of side chains of pectins in the plant cell walls and their contribution to functional properties in food systems with particular reference to gelling and rheological properties. Also the possible implications brought about by structural and topological knowledge of side chains in the plant cell walls are discussed for enzymatic extraction of pectins. 96 references. SD

2029

Mabon (TJ). **Colour measurement of food.** *Cereal Foods World* 38(1): 1993: 21-25

The objective of this article is to discuss optical characteristics of food products, pitfalls of subjective evaluations of colour, colour scales and indices used in the food industry, instrument technology and sensor geometry, and methods of colour measurement. CSA

2030

Shankaranand (VS) and Lonsane (BK). **Potential and economic avenue to efficiently meet the demand of citric acid by food and beverage industries.** *Beverage and Food World* 19(5): 1992: 31-34, 36

2031

Deighton (N), Glidewell (SM), Goodman (BA) and Morrison (IM). **Electron paramagnetic resonance of  $\gamma$ -irradiated cellulose and lignocellulosic material.** *International Journal of Food Science and Technology* 28(1): 1993: 45-55

Results of the investigation of the Electron Paramagnetic Resonance (EPR) spectra of  $\gamma$ -irradiated celluloses and of the products from a lignocellulosic material (oat straw) subjected to various chemical treatments is presented. The chemical treatments of cellulosic material involving strong alkali (greater than or equal to 15% in the present measurements) during purification result in subtle structural alterations. GS



2032

Pinnioja (S), Autio (T), Niemi (E) and Pensala (O). **Import control of irradiated foods by the thermoluminescence method.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 196(2); 1993; 111-115

A thermoluminescence (TL) method was applied for the import control of irradiated foods. The method is based on the detn. of the TL of mineral contaminants in foods. Detection of irradiation was incorporated in official Finnish control procedures in spring 1990. For foodstuffs with a reduced microbe content and in which no fumigant residues are found, possible irradiation is investigated by the TL method. The minerals are separated from the foods in different ways: picking is used for spices; water rinsing for herbs, spices, berries and mushrooms; high-density liquid to separate the organic material from the mineral fraction in seafood; and carbon tetrachloride for foods forming gels with water. To date about 140 food samples have been analysed for control purposes: 50 samples of herbs and spices, 25 samples of berries and mushrooms and 65 samples of seafood. Of these, 14 samples of herbs and spices and 5 samples of seafood were shown to have been irradiated. Differences in TL intensity between irradiated and unirradiated samples were at least 1 and usually 3-4 orders of magnitude. AA

2033

Choudhury (S), Boruah (M) and Goswami (TD). **Estimation of uranium in some edible and commercial plants.** *Defence Science Journal* 42(4); 1992; 241-243

The av. uranium content in some edible (cereals, pulses, vegetables, leafy vegetables and fruit vegetables) and commercial plants (betel leaves, tobacco leaves, arecanuts and lime) vary from 0.25 to 2.67 p.p.m. BV

2034

Bouraoui (M), Richard (P) and Fichtali (J). **A review of moisture content determination in foods using microwave oven drying.** *Food Research International* 26(1); 1993; 49-57

This paper reviews the use of microwave drying for food moisture content detn. Successful approaches for a var. of food products were summarized and their findings discussed. Results were compared with conventional techniques. Generally, the magnitude of error was small. Several parameters that affect measurement accuracy were discussed. These included among others, drying time,

microwave power, sample mass and composition, and container size, geometry and location in the oven. AA

2035

Xu (P), Price (J) and Aggett (PJ). **Recent advances in methodology for analysis of phytate and inositol phosphates in foods.** *Progress in Food and Nutrition Science* 16(3); 1992; 245-262

Summarises the methods available for the analysis of phytate and structurally related molecules, i.e. inositol polyphosphates. Methods reviewed for the detn. of phytate (inositol hexakisphosphate) are: colorimetric methods, conventional anion exchange column chromatography, NIR reflectance spectroscopy and phosphorus-31 Fourier transform NMR spectroscopy. Methods covered for analysis of phytate and lower inositol phosphates are: low pressure anion exchange column chromatography and HPLC. Other methods discussed for the quantitation of inositol phosphates separated by HPLC include: on-line post column reaction and detection and off-line detection methods. 83 references. BV

## FOOD MICROBIOLOGY AND HYGIENE

2036

Bhabha Atomic Research Centre (Bombay). **DAE Symposium on Advances in Molecular Biology. 15th-17th January, 1990.** Bhabha Atomic Research Centre, Bombay. v+531; 1990

This symposium covers articles on structural analysis of glutenin storage protein in rice by Yogesh R. Mawal, Vidya Gupta and Ranjekar, P. K. (pp. 340-347, 5 refs); Protein phosphorylation in *Brassica juncea* and *Oryza sativa* under salt stress by Anjali S. Gujar and Pranab Roy (pp. 348-357, 20 refs); Characteristics of some biochemical mutants of grain pea *Pisum sativum* by Sushil Kumar (pp. 358-366, 4 refs); De novo synthesis of orthodiphenol oxidoreductase in potato: Regulation by Bhat, S. G. et al (pp. 398-404, 16 refs); and Isozyme changes associated with salt tolerance in Callus tissues of rice by Narayanan, K. K. (pp. 410). CSA

## Enzymes

2037

Torronen (A), Leisola (M) and Haarasilta (S). **Inhibition of rye  $\alpha$ -amylase activity by  $\alpha$ -amylase inhibitor.** *Cereal Chemistry* 69(4); 1992; 355-358

Endogenous  $\alpha$ -amylase inhibitors from barley, wheat, soy and rye were found to inhibit rye



$\alpha$ -amylase. The inhibitor from barley was studied in detail. This proteinaceous molecule was stable at alkaline pH range and most active when the pH was over 7.0. The rye  $\alpha$ -amylase-inhibitor complex was not heat stable, but bovine serum albumin stabilized the complex. The falling number and amylograph tests showed that the inhibitor could be considered a potential- $\alpha$ -amylase inhibitor in breadmaking when flour made of sprout-damaged rye is used. AA

## Microorganisms

2038

Eckner (KF). **Bacteriocins and food applications.** *Dairy, Food and Environmental Sanitation* 12(4): 1992: 204-209

The potential use of bacteriocins in food industry has spurred research and provided an effective means of ensuring food safety by inhibiting foodborne pathogens, by aiding in the preservation of foods, by controlling fermentations, and by preventing or reducing food spoilage while extending the shelf-life and stability of the product with regard to microbial activity. Aspects considered are: the nomenclature for bacteriocins, protein/structures, mode of action, production, gene encoding, bacteriocin-producing strains, (*Lactobacillus*, *Listeria*, *Micrococcus*, *Staphylococcus*, *Streptococcus*, *Pedococcus*, *Clostridium*, *Comynebacterium*, *Mycobacterium*, *Sarcina*, *Streptomyces*), food safety, preservation and spoilage (meats, fish, dairy products, cereals, fruits and vegetables, beverages), shelf-life vs refrigerated products, future uses and potential. 65 references. SRA

## Bacteria

2039

Baranyi (J), Roberts (TA) and McClure (P). **A non-autonomous differential equation to model bacterial growth.** *Food Microbiology* 10(1): 1993: 43-59

In order to describe the dynamics of growing bacterial cultures a non-autonomous differential equation is applied. The model describes the lag phase as an adjustment period and for the lag-parameter a new definition is introduced. Some mathematical aspects of the model are described and, on the basis of more than 500 growth curves, its statistical properties are compared with the Gompertz-approach commonly used in food microbiology. AA

2040

Payne (MJ), Campbell (S) and Kroll (RG). **Lectin-magnetic separation can enhance**

**methods for the detection of *Staphylococcus aureus*, *Salmonella enteritidis* and *Listeria monocytogenes*.** *Food Microbiology* 10(1): 1993: 75-83

The ability of lectins from *Triticum vulgare* and *Agaricus bisporus*, immobilized on magnetic microspheres, to enhance the sensitivity of conventional plating methods of detection of *Salmonella enteritidis*, *Listeria monocytogenes* and *Staphylococcus aureus* from enrichment cultures of inoculated raw egg, ground beef, braising steak or Camembert cheese was investigated. With some lectin/organism/food combinations, the immobilized lectins were effective at separating the organisms but no, or little, enhancement of sensitivity of detection was observed. This should, however, provide 'cleaner' microbiological samples which could enhance the sensitivity of some rapid microbiological methods. However, the sensitivity of detection of *S. enteritidis* in beef samples by conventional plating methods was enhanced by 2 orders of magnitude and *Staph. aureus* (at low cell densities) by one order or magnitude. AA

2041

Okiyama (A), Shirae (H), Kano (H) and Yamanaka (S). **Bacterial cellulose I. Two-stage fermentation process for cellulose production by *Acetobacter acet*.** *Food Hydrocolloids* 6(5): 1992: 471-477

Production of cellulose by *Acetobacter acet* AJ12368 was optimized in a two-stage fermentation process. A cell growth stage in an air-lift fermenter (agitated culture) was followed by a cellulose formation stage in production incubators (static culture). The optimal moment of process change was at day 3 of agitated culture when the cell density and intracellular Adenosine triphosphate content peaked; at this time culture broth in the air-lift fermenter could be subdivided to feed four production incubators equipped with 9 trays. Surface aeration was effective in producing food-use gelatinous cellulose which is homogeneous and low in syneresis. This process was more economical than the conventional fermentation procedure in the Nata industry. AA

2042

Okiyama (A), Motoki (M) and Yamanaka (S). **Bacterial cellulose. II. Processing of the gelatinous cellulose for food materials.** *Food Hydrocolloids* 6(5): 1992: 479-487

Gelatinous cellulose prepared by fermentation with *Acetobacter acet* AJ 12368 consisted of cellulose fibrils (0.9%), bound water (0.3%) and free water (98.8%). The cellulose network absorbed water weakly in capillaries of about 0.5 - 1.0 microns.



deformed without fracture. The gel by itself was too tough to bite, but it became edible through processing either with sugar alcohol or with alginate and calcium chloride. The textures resemble fruit, such as grapes and molluscs such as squids, respectively. The mechanism is the immobilization of the water of gelatinous cellulose by viscous or gel-forming material, and accordingly the gel becomes easy to cut off with the teeth. The results show that gelatinous cellulose with its fibrous texture can be a new material for salads, low-calorie desserts, fabricated foods etc. AA

### Blue-green algae

2043

Hori (K), Ueno-Mohri (T) and Okita (T). **Absorption of colour additives and settling volume in water of blue-green alga, ishikurage (*Nostoc commune*)**. *Plant Foods for Human Nutrition* 42(1): 1992: 31-36

The properties of ishikurage (*Nostoc commune*) and other algae were compared. Ishikurage and suizenji nori (*Aphanothece sacrum*) absorbed much more amaranth than others. They have a high settling vol. (SV) in water. The high of SV of ishikurage is attributable to its neutral detergent fiber (NDF). The acid detergent fiber (ADF) from the alga had a high amaranth absorption. However the absorption by the ADF did not explain the absorption by ishikurage. The results suggest that ishikurage may have a nutritional significance as a source of dietary fiber. AA

### *Escherichia coli*

2044

Buchanan (RL) and Klawitter (LA). **The effect of incubation temperature, initial pH, and sodium chloride on the growth kinetics of *Escherichia coli* 0157:H7**. *Food Microbiology* 9(3): 1992: 185-196

A total of 184 aerobic and 144 anaerobic cultures were generated, representing 75 and 70 variable combinations, respectively. Comparison of lag phase durations (LPDs), generation times (GTs) and estimated time to achieve a three log cycle increase in population density ( $10^2 - 10^2$  cfu ml<sup>-1</sup>) suggested that aerobic conditions tended to enhance growth. The max. population densities (MPDs) achieved by the cultures were largely independent of the three variables (incubation temp, initial pH and NaCl level); however, there was a general depression of MPDs by 0.5-1.0 log cycles when the cultures were incubated anaerobically. Under optimal conditions, GTs and LPDs were largely unaffected by initial pH values greater than or equal to 5.5. The growth rate

of the organisms decreased with increasing NaCl level, with the effect being greater in the other variables were also non-optimal. Comparison of the present data with previous reports suggest that the growth kinetics of *E. coli* 0157:H7 are similar to those for non-pathogenic strains. SRA

### *Yersinia*

2045

Greenwood (MH). **Comparison of enrichment at 9°C and 21°C for recovery of *Yersinia* species from food and milk**. *Food Microbiology* 10(1): 1993: 23-30

The recovery of *Yersinia* sp. from food and milk samples enriched in tris-buffered 1% peptone water pH 8.0 incubated at 9°C was compared with recovery after incubation at 21°C. The recovery rates for the 2 temp. were similar except for pasteurized milk samples, for which significantly better recovery was obtained at 9°C. To obtain parity of recovery, incubation at 21°C required subculture after 4-7 days and 11-14 days; extending the period of incubation beyond 6 or 7 days resulted in an increased recovery of 26%. Under these conditions, incubation at 21°C is a suitable alternative to incubation at 9°C isolation of *Yersinia* spp. from food samples but not from pasteurized milk. AA

### Fungi

#### *Aspergillus flavus*

2046

Ellis (WO), Smith (JP), Simpson (BK), Khanizadeh (S) and Oldham (JH). **Control of growth and aflatoxin production of *Aspergillus flavus* under modified atmosphere packaging (MAP) conditions**. *Food Microbiology* 10(1): 1993: 9-21

The combined effect of  $a_w$ , pH, storage temp. and initial headspace O<sub>2</sub>/CO<sub>2</sub> concn. on the growth of and aflatoxin production by *Asp. flavus* in malt extract agar (MEA) plates packaged in a high gas barrier film after 15 days was studied. Results showed that mold growth was either completely inhibited or was visible after 1-2 days. Generally growth was more extensive in plates packaged in 10-20% O<sub>2</sub> (54 - 48% CO<sub>2</sub>) and stored at 25 - 35°C. Growth of *Asp. flavus* was inhibited when stored at 15 - 20°C irrespective of the gas atm. Aflatoxin production was max. at a colony diam. of 7 mm and then decreased with increasing colony diam. In all cases where growth occurred, the level of aflatoxin was < the current regulatory standard of 20 ngg<sup>-1</sup>. Study showed that *A. flavus* can grow in a CO<sub>2</sub> enriched atm. if headspace oxygen is present. SRA



2047

Bhattacharyya (PR), Adhikary (RK) and Bordoloi (DN). **Population dynamics of insect pests and damage of the white button mushroom in the environment of North Eastern India.** *Journal of Food Science and Technology (India)* 30(5): 1993: 377-379

Insects belonging to order viz., Diptera, Hymenoptera, Coleoptera, Collembola and Homoptera were found attacking white button mushrooms (WBM) during cropping season of 1990-91. Mean total population showed a relationship with temp. fluctuation during the period. Diptera accounted for the highest population (18.5 plus or minus 0.53/trap/day, 94.9% of the total population). Highest overall population among the Dipterans was in the order of phoridae (8.58 plus or minus 0.31) followed by Sciaridae (5.58 plus or minus 0.26) and Cecidomyidae (4.56 plus or minus 0.23). Population fluctuation varied in different months. Crop yield was considerably affected (49%) by insect pests. SD

2048

Khanna (PK), Bhandari (R), Soni (GL), Singh (CK), Garcha (HS), Mittar (D). **Role of mushroom (*Pleurotus florida*) as hypocholesterolemic/hypolipidemic agent.** *Indian Journal of Experimental Biology* 31(6): 1993: 567-568

Male albino rats of group A (control) were fed on hypercholesterolemic diet containing 64% starch, 10% groundnut oil, 15% casein protein, 4% salt mixture, 1% yeast powder, 5% cellulose and 1% cholesterol, and group B and C on hypercholesterolemic diet containing 5 or 10% dried mushroom (*P. florida*) for 4 wk. Results showed that the inclusion of mushroom at 5 or 10% level in the diet increased the food intake (363.3 plus or minus 18.50 and 393.3 plus or minus 3.3) significantly as compared to control (212.6 plus or minus 6.4) without any significant effect on gain in body wt. but lowering food efficiency ratio. Cholesterol and glyceride levels in plasma were significantly decreased as reflected in both high density lipoprotein and very low density lipoprotein fractions. Inclusion of mushroom in diet did not show any untoward reaction at the cellular level as evidenced by similar lipid peroxidation and histopathological aberrations of various tissues compared to those in control groups. SRA

2049

Lopez-Briones (G), Varoquaux (P), Bureau (G) and Pascat (B). **Modified atmosphere packaging of**

Four microporous films in oriented polypropylene (OPP) and a film used to overwrap mushroom punnets (stretchable PVC) were tested for packaging mushrooms, which have a high respiration rate. Mushroom punnets placed into pouches were stored at 4 and 10°C for 8 days and the effects of modified atm. packaging (MAP) on the quality (whiteness, texture, stage of maturity and microbial contamination) of mushrooms was studied. The optimum atm. should contain 2.5 - 5% CO<sub>2</sub> and 5-10% O<sub>2</sub>. A highly permeable film such as 30 PB 260 (200 000 ml O<sub>2</sub> or CO<sub>2</sub>/m<sup>2</sup> day atm.) resulted in a contamination of 10<sup>7</sup> CFUg<sup>-1</sup>. GS

## Yeasts

2050

Samoon (AH). **Role of yeasts in fermentation and spoilage of foods and beverages.** *Beverage and Food World* 19(5): 1992: 56-58

Yeasts play an important role in fermentation of various food and beverages. Several yeasts are increasingly used commercially in food and beverages fermentation industry now-a-days. However, some species of yeasts may also be associated with development of off-flavours, abnormal colours and spoilage in foods and beverages. Various commercially important species of yeasts have been classified and their vital behavioural characteristics in relation to food substrates have been discussed here in detail. Methods employed for identification and characterization of commercially important yeasts in foods and beverages have also been discussed. AA

2051

Yamani (MI). **Yoghurt whey medium for food-borne yeasts.** *International Journal of Food Science and Technology* 28(1): 1993: 111-116

A selective medium based on yoghurt whey was developed for the enumeration of yeasts in foods. Yoghurt whey agar (YWA) was prepared by mixing one part of a sterile agar sol. (5%) with two parts of a sterile whey filtrate obtained from autoclaved (121°C, 20 min) plain set yoghurt. The performance of YWA in the enumeration of yeasts was compared with that of plate count agar plus antibiotics (APCA) and acidified potato dextrose agar (PDA-A) by examining food samples and broth cultures of known yeast isolates. APCA ranked first, confirming the superiority of antibiotic amended media over the acidified ones. The overall performance of YWA was comparable to that of PDA-A. AA



## BIOTECHNOLOGY

2052

McEvoy (TG), Robinson (JJ) and Sreenan (JM). **A role for transgenic animals in food production.** *Trends in Food Science and Technology* 3(11): 1992: 294-302

This review examines the possibilities of applying gene transfer technology in food production and quality control; its acceptability and its relevance to producers and consumers of food produced from mammals, birds and fish. Aspects highlighted are direct roles for transgenic animals (growth, reproduction, milk production) and indirect roles for transgenic animals (disease control digestion). 66 references. GS

2053

Department of Food Technology and Biochemical Engineering (Calcutta). **Lowcost Biotechnological Processes for Preservation of Vegetables.** *Proceedings of the National Seminar. Calcutta. 27th March 1987. Department of Food Technology and Biochemical Engineering, Calcutta.* 1-50: 1988

The articles presented at the proceedings include low-cost preservation of vegetables by lactic fermentation by Steinkraus, K. H. (pp. 5-11); Low-cost rural oriented technique for storage of vegetables by Susanta, K. Roy and Pal, R. K. (pp. 14-16); Improving food supplies and lowering the poverty line through biotechnology of vegetable conservation and processing by Parpia, H. A. B. (pp. 16-26); Impact and applications of biotechnology and genetic engineering to the food industry by Steinkraus, K. H. (pp. 28-32) and Promotion of fermentative method of preservation of vegetables in rural areas of West Bengal by Sunit Mukherjee and Gangopadhyay, H. (pp. 33-38). CSA

## TISSUE CULTURE

Nil

## FOOD ADDITIVES

### Acidulants

2054

anon. **Choice of acidulants in food processing.** *Average and Food World* 19(5): 1992: 60-61

## Colourants

### Saffron

2055

Saito (K). **A new enzymatic method for the extraction of precarthamine from dyer's saffron florets.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 197(1): 1993: 34-36

Precarthamine was extractable at a high yield from the floret paste of dyer's saffron, when pretreated with glucosidase in water. The hydrolysate extraction conditions, recovery rate, and identification were studied in order to establish a new enzymatic method for the preparation of precarthamine. The results are evaluated by comparison with the old procedures. AA

## CEREALS

2056

Gahlawat (P) and Sehgal (S). **Phytic acid, saponins, and polyphenols in weaning foods prepared from oven-heated green gram and cereals.** *Cereal Chemistry* 69(4): 1992: 463-464

### Barley

2057

Tester (RF), Morrison (WR) and Schulman (AH). **Swelling and gelatinization of cereal starches. V. Riso mutants of Bomi and Carlsberg II barley cultivars.** *Journal of Cereal Science* 17(1): 1993: 1-9

Mutations affecting protein synthesis were accompanied by changes in starch chemistry and physical properties of high lysine barley. Reduced activity of soluble starch synthase played a role in depressing the deposition of starch in granules. Swelling factors at 80°C, above the gelatinization temp. range were inversely correlated with liquid content and were within the range of normal, fully-mature barley starches. No major mutants for starch structure, such as waxy, high-amylose or amylose extender were found. Lipid content was very low in Riso 527 and very high in Riso 17. GS

2058

Tester (RF) and Morrison (WR). **Swelling and gelatinization of cereal starches. VI. Starches from waxy hector and hector barleys at four stages of grain development.** *Journal of Cereal Science* 17(1): 1993: 11-18

Lipid-complexed amylose (LAM) and lipid-free amylose (FAM) contents of waxy and non-waxy starches increased during barley grain development and starch accumulation. Changes in amylopectin (AP) structure and starch crystallinity appear to be less and variation in resistance to linterization (acid hydrolysis) in swelling at 80°C and in peak gelatinization temp. was attributed to different levels of FAM and LAM. GS

2059

Czuchajowska (Z), Szczodrak (J) and Pomeranz (Y). **Characterization and estimation of barley polysaccharides by near-infrared spectroscopy. I. Barleys, starches, and  $\beta$ -D-glucans.** *Cereal Chemistry* 69(4): 1992: 413-418

Large and small starch granules were isolated from regular amylose (about 25%), high-amylose (44-49%), and high-amylopectin (traces of amylose) barleys. Their near-infrared reflectance (NIR) spectra were compared with those of relatively pure (1-3), (1-4)- $\beta$ -D-glucans from barley and oats and with NIR spectra of ground barleys - naked and covered, regular, high-amylose, and high-amylopectin. The objective was to obtain detailed information on NIR spectra of barleys, isolated starches, and isolated  $\beta$ -D-glucans to serve as a basis for development of a NIR spectroscopy method for  $\beta$ -glucan assay in barleys. There was little difference in NIR spectra of hull-less and covered barleys; whole meals of regular, high-amylose, and high-amylopectin barleys showed similar spectra. Small differences were recorded between spectra from high-amylose and regular or high-amylopectin starches. Spectra of starches and whole meals from which the starches were obtained differed widely. Major differences were recorded in three areas over the whole range of 1600, 2, 2,400 nm, for whole meals, isolated starches, and isolated  $\beta$ -glucans. They included 1) wavelengths 1,702, 1,707, 1,772 and 1,773 nm, principal bands of starches, cellulose, and hemicellulose; 2) 2,060, 2,096 and 2,132 nm, bands associated with the interaction between starch and protein; and, foremost 3) 2,268, 2,282 and 2,335 nm, bands that typify starch,  $\beta$ -glucans, and cellulose. AA

2060

Szczodrak (J), Czuchajowska (Z) and Pomeranz (Y). **Characterization and estimation of barley polysaccharides by near-infrared spectroscopy. II. Estimation of total  $\beta$ -D-glucans.** *Cereal Chemistry* 69(4): 1993: 419-423

Total  $\beta$ -glucans were determined in 139 barleys, 84 of which were used for calibration and 55 for validation. They included covered two- and

six-rowed regular (about 25% amylose in the starch barleys, covered and hull-less waxy (up to 100% amylopectin) and high-amylose (up to 49% amylopectin) barleys, and chemically treated and  $\gamma$ -irradiated barleys. Both commercial and varietal samples (from 3 locations) were used. The total  $\beta$ -glucan content ranged from 2.7 to 9.5% and was higher in waxy than in regular or high-amylose barleys. Equations for prediction of  $\beta$ -glucan content by the best fit of 3 wavelengths and the single-wavelength (2,264 or 2,348 nm) method (using the step-up program) were developed. The standard error of prediction for both was slightly above 0.6%. The 3 selected wavelengths were in the 2,260- to 2,380-nm region, previously found by us to be typical for  $\beta$ -glucans. In light of the highly heterogenous populations used in this study, the accuracy of predicting the  $\beta$ -glucan contents in the validation samples was affected by the identity of barleys used for developing the prediction equations. Preliminary studies indicated that even for more homogenous populations, the results may be affected by kernel size, hardness, and protein contents. The above parameters may have to be included in developing equations to predict the  $\beta$ -glucan contents of barleys. AA

## Oats

2061

Marklinder (I) and Lonner (C). **Fermentation properties of intestinal strains of *Lactobacillus* of a sour dough and of a yoghurt starter culture in an oat-based nutritive solution.** *Food Microbiology* 9(3): 1992: 197-205

The properties of the fermented oatmeal soup were shown to be influenced by the strain of *Lactobacillus* used as starter culture. The fermentation properties in the soups fermented by *L. plantarum* strains A1 (isolated from rye sour dough) and 299 (isolated from human intestine) appeared to be similar. There were similarities between *L. reuteri* strains 47 and 108 isolated from rat and human respectively. The homoferment bacteria contributed to a more tasty soup. *L. plantarum* strains 299 and A1, *L. casei* ssp. *rhamnosus* strain 271, *L. gasseri* strain 292 and *L.sp* strain 99a were found to be potential as starter cultures for fermenting oatmeal soups. SRA

2062

Ekstrand (B), Gangby (I) and Akesson (G). **Lipase activity in oats - Distribution, pH dependence, and heat inactivation.** *Cereal Chemistry* 69(4): 1992: 379-381

The lipase activity in oat kernels at different pHs, at different stages of development, and in different parts of the oat kernel was studied. The



Measurement of lipase activity was performed by means of fluorescence spectrophotometry. Lipase activity was higher in the aleurone layer and embryonic tissues than it was in the starchy endosperm. This also was shown in flour samples from fractionated milling. In accordance with the lipase distribution found in the oat kernel, the lipase activity was highest in flour fractions close to the superficial bran layer and was lowest in the internal endosperm fractions. The development of lipase activity during germination of the seeds caused an increase in the activity at neutral and alkaline pH, whereas the activity at acid pH remained relatively constant. This indicated that the lipase activity at alkaline pH was more related to the metabolic processes initiated by the growth of the embryo. Three different Swedish cvs were analyzed. Lipase activity varied only slightly and was not correlated to fat content. Lipase inactivation was studied in model lab. studies. These showed the importance of good heat transport into the sample, not only high temp., in activating the enzyme. AA

## Paddy

2063

Indudharaswamy (YM), Unnikrishnan (KR) and Narasimhan (KS). **Changes in free fatty acids and insect infestation during storage of brown rice obtained by shelling paddy in rubber roll and disc shellers.** *Journal of Food Science and Technology (India)* 30(5); 1993; 324-330

Brown rice obtained from IR20 paddy was stored in cloth bags and bottles at cold (4 - 6°C), room temp. (RT), 37°C, 62% RH and 37°C, 92% RH with and without insects upto 13 months. Free fatty acids (FFA) (< 3% initially) increased with storage, the increase being almost double in disc-shelled rice than in rubber roll shelled rice. High temp., RH and cloth bag increased FFA. Insects even though did not survive at 37°C, 62% RH, multiplied rapidly at RT and spoiled the rice in 3 months. SD

## Quinoa

2064

Ruales (J) and Nair (BM). **Nutritional quality of the protein in quinoa (*Chenopodium quinoa*, Willd) seeds.** *Plant Foods for Human Nutrition* 42(1); 1992: 1-11

The nutritional quality of protein in quinoa seeds has been determined by amino acid assay and by animal feeding experiments. The amino acid composition of the protein in raw quinoa and washed quinoa show similar pattern. The first limiting amino acids were the aromatic amino acids tyrosine + phenylalanine giving a chemical score of

86 for protein in raw quinoa and 85 for protein in washed quinoa. Threonine was the next limiting amino acid followed by lysine. The amount of lysine and sulphur amino acids (methionine + cystine) was relatively high. In general, the content of essential amino acids in quinoa is higher than in common cereals. The animal experiments showed NPU values of 75.7, BV of 82.6 and TD value of 91.7 for the protein in raw quinoa. Results of the in-vitro enzymatic methods showed that the digestibility of the protein in quinoa is comparable to that of other high quality food proteins. The corresponding experiments carried out with samples of quinoa seeds, which have been processed to remove the saponins, showed that, the saponins do not exert any negative effect on the nutritive quality of the protein. AA

## Rice

2065

Pandey (JP) and Sah (PC). **Rice kernel breakage kinetics in the process operation for bran removal.** *Journal of Food Science and Technology (India)* 30(5); 1993; 365-367

Effect of polishing time and degree of polish on breakage behaviour on 5 paddy var. Prasad, Manhar, Sita, UPR 239 and PD4 were studied. The percentage breakage increased non-linearly with milling time but the breakage varied linearly with degree of polish. The breakage behaviour depended on paddy var. SD

2066

Chang (S-M) and Yang (H-C). **Thermal processing effects on rice characteristics.** *Food Structure* 11(4); 1992; 373-382

Whole kernels of 4 cvs of milled rice viz Koahsilling Sen 7, Taichung Sen 10, Taichung, 67 and Taichung Waxy 46 were thermally treated by boiling, steaming, autoclaving or roasting with sand and degree of gelatinization, water absorption index, water soluble index, swelling power, viscoamylograms and X-ray diffraction patterns determined. The waxy rice samples were more highly gelatinized than non-waxy samples especially in samples with optimal moisture contents and at high temp., the amylose contents of rice being the important factor. SD

## Rice bran

2067

Newman (RK), Betschart (AA), Newman (CW) and Hofer (PJ). **Effect of full-fat or defatted rice bran**



Rice bran has been shown to lower serum cholesterol in hamsters. Leghorn cockerel chicks were fed 60% full-fat rice bran (FFRB) and corn/soy (CS) diets with 0.5% added cholesterol. Both diets contained 18% protein. All reported parameters are on blood serum. Significant differences ( $p < 0.05$ ) were found in total cholesterol (TC), triglycerides (TG), high-density and low-density lipoprotein cholesterol (HDL and LDL). In a second study, chicks were fed FFRB, defatted rice bran (DFRB), and CS diets balanced for 18% protein, 14.47% total dietary fiber and 10.78% lipid with 0.5% added cholesterol. Both TC and TG were significantly lower ( $p < 0.05$ ) in chicks fed FFRB and CS diets. Significant differences were found in HDL values for all diets with FFRB exhibiting the highest mean value (155 mg/dl) and CS exhibiting the lowest mean value (114 mg/dl). All diets were significantly different ( $p < 0.05$ ) in LDL, with mean values of 249, 318 and 275 mg/dl for FFRB, DFRB and CS, respectively. FFRB appears to increase HDL and to lower LDL in chicks, but does not always affect TC, whereas DFRB may increase all three serum lipid components. AA

## Wheat

2068

Ereifej (KI) and Shibli (RA). **Quality evaluation of 'Landrace' and 'Durum' wheat cultivars grown in Jordan.** *Journal of Food Science and Technology (India)* 30(5): 1993: 339-343

Ten 'Durum' wheat cvs (including a 'Landrace', old and newly developed cvs) have been evaluated for a number of quality parameters. The 'Landrace Horani-27', had the highest protein content (14.4%), but intermediate flour yield (43.7%), 'Lacesh', gave highest flour yield (57.5%), particle size index (PSI) (19.7%), sodium dodecyl sulphate sedimentation (SDS-SED) (52 ml), but was intermediate in protein content (9.7%). The old cvs, 'Der Alla-2' and 'Der alla-6' had no clear-cut patterns for the quality parameters studied. Proximate analysis showed that these cvs were higher than av. for fibre and ash contents. It was possible to cluster these cvs into 3 groups each for flour yield, protein content, SDS-SED, PSI % and thousand kernel wt. The variability in the composition of each cluster allows for combining certain cvs to complement each other for a better balance of these quality traits. AA

2069

Singh (KSSN) and Singh (RP). **Studies on improvement of quality of wheat infected with**

**Karnal Bunt. 1. Milling, rheological and baking properties.** *Indian Miller* 23(1): 1992: 21-29

Among the 4 treatments - washing, debranning, debranning followed by washing and lye peeling, the latter two improved the yield quality (ash content, milling value, colour grade value); increased the proteolytic activity, total polyphenols, free fatty acids and trimethylamine content, and improved dough rheological characteristics, bread quality and acceptability. SD

2070

Panozzo (JF) and McCormick (KM). **The rapid viscoanalyser as a method of testing for noodle quality in a wheat breeding programme.** *Journal of Cereal Science* 17(1): 1993: 25-32

A comparative study was made between the Rapid Visco Analyser (RVA) using wholemeal wheat flour and starch samples with the Brabender Viscoamylograph using flour or starch. Whole meal grist, flour and starch samples from wheat were tested using the RVA by heating a 3-4 g sample, suspended in distilled water to 60°C for 4 min, then increasing the temp. to 95°C and holding for 8 min and finally cooling to 50°C for 8 min. Flour and starch (50 g for flour, 35 g for starch, dry basis) were also heated at a rate of 1.5°C/min in a Brabender Viscoamylograph. The correlation between the two method was  $P < 0.01$ . The RVA is advantageous because of its high correlation with the traditional Japanese white salted noodles, its rapidity and organoleptic quality. GS

2071

Fouques (D), Lauriere (M) and Landry (J). **Characterization and quantification of high  $M_r$  subunits of wheat glutenin by amino acid analysis after electroblotting.** *Journal of Cereal Science* 17(1): 1993: 63-70

The amino acid compositions of the high relative mol. mass ( $M_r$ ) or high mol. wt. (HMW) subunits of wheat glutenin were determined by the phenylthiocarbamyl (PTC) derivative procedure with polypeptides separated by sodium-dodecyl sulphate polyacrylamide gel electrophoresis SDS-PAGE and electroblotted onto polyvinylidene difluoride (PVDF) membranes. Four bands (three corresponding each to a single subunit and one to a mixture of two subunits) from the cv Courtot were analysed, either directly on the electroblotted membrane or after elution of the polypeptides. As little as 10 µg of protein was suitable for a complete analysis. The compositions obtained were consistent with published data obtained either from similar biochemical studies or from cDNA sequences when available. AA



2072

Marchylo (BA), Hatcher (DW), Kruger (JE) and Kirkland (JJ). **Reversed-phase high performance liquid chromatographic analysis of wheat proteins using a new, highly stable column.** *Cereal Chemistry* 69(4); 1992: 371-378

A new class of sterically protected monofunctional-silane bonded phase columns (C8 and CN) was evaluated to determine resolution capabilities and long-term stability in the RP-HPLC separation of wheat storage proteins. Up to 450 separations were performed using the high temp. (50°C) and low pH (<3) conditions required to resolve gliadins and glutenins. Superior resolution of these proteins was achieved with the new widepore, sterically protected columns as compared to that from conventional silica-based RP-HPLC columns. Statistical analysis of retention times and quantified peak areas also indicated improved stability and reproducibility as compared to that from conventional RP-HPLC columns. Column-to-column variability also appeared minimal. Analysis of storage proteins (gliadins or glutenins) of different wheat varieties and high mol. wt. glutenin subunits exemplified the suitability of these columns for varietal identification and the study of quality-related wheat storage proteins. AA

2073

Lim (H), Setser (CS), Paukstelis (JV) and Sobczynska (D). **Nuclear magnetic resonance studies on wheat starch-sucrose-water interactions with increasing temperature.** *Cereal Chemistry* 69(4); 1992: 382-386

Water mobility in wheat starch-sucrose-water dispersions was observed by measuring the transverse relaxation rate ( $R_2$ ) from  $^{17}\text{O}$  nuclear magnetic resonance spectra. Sucrose resulted in an increase in the  $R_2$  or a decrease in the mobility of water and in temp. of the  $R_2$  max. as temp. was increased from 35 to 81°C. Starch increased the  $R_2$  by decreasing the mobility of water in the sample systems. The results indicated that a sucrose-starch interaction also contributed to the decreased water mobility. The onset temp. of starch gelatinization, as determined by differential scanning calorimetry, appeared to occur shortly after the water reached its  $R_2$  max. AA

2074

Case (SE), Hamann (DD) and Schwartz (SJ). **Effect of starch gelatinization on physical properties of extruded wheat- and corn-based products.** *Cereal Chemistry* 69(4); 1992: 401-404

Wheat flour, wheat starch, corn meal, and corn starch were extruded in the form of a half-product using a pilot-plant model twin-screw extruder. Starch was gelatinized from 20 to 100%. The final cooked product (vegetable oil, 196°C) was tested for texture using the Kramer shear press on an Instron universal testing machine. As gelatinization increased, vol. of the puffed product increased and bulk density decreased. A min. bulk density was achieved at approx. 75% gelatinization for all products except corn meal, which had a min. density at approx. 55% gelatinization. Peak force at failure had a parabolic response to gelatinization. The same force is required for failure at high and low extents of gelatinization, although textural and physical attributes differed substantially. Gelatinization was modelled by the ratio of total energy to peak force at failure ( $E_1/PkF$ ) from the Instron data, which was influenced by the combination of bulk density and deformability. AA

2075

Slaughter (DC), Norris (KH) and Hruschka (WR). **Quality and classification of hard red wheat.** *Cereal Chemistry* 69(4); 1992: 428-432

Twelve quality assessments of hard red spring and hard red winter wheat were evaluated over a 3-year period to determine which could best fulfil the intent of the U.S. Grain Standards Act of 1916 and the U.S. Grain Quality Improvement Act of 1986 in determining market class. The study indicated that of the 12 quality evaluations, protein content and kernel hardness were the best suited to be used as classification tools for differentiating hard red spring and hard red winter wheat and that other quality assessments not as well suited also were highly correlated with protein content. A classification model based on protein content and wheat hardness successfully classified 92.7% of the hard red winter wheats and 91.5% of the hard red spring wheats over the 3 years studied, when changes in growing conditions were incorporated into the model. A hardness and protein index was defined as a possible means of implementing in a single score the quality characteristics of hard wheat sample. AA

2076

Kim (SS) and Setser (CS). **Wheat starch gelatinization in the presence of polydextrose or hydrolyzed barley  $\beta$ -glucan.** *Cereal Chemistry* 69(4); 1992: 447-452

Polydextrose was fractionated (into fractions with degrees of polymerization [DP] of 3-4, 6-7, 12-16 and > 20) using Sephadex G-25 gel chromatography to study the effect of solute or carbohydrate size on thermal phase transitions of wheat starch. Polydextrose and its fractions that were obtained



using distilled water as an eluent were compared with 5 or 10% sol. of hydrolyzed barley  $\beta$ -D-glucan or sucrose at a 2:1 sol.-starch ratio. Other eluents, 0.5 M NaCl in 0.1 M phosphate buffer and 0.1 M ammonium acetate in 20% (v/v) ethanol, were evaluated. They resulted in contamination of polydextrose fractions by eluent salts or ions that caused a significant increase in starch gelatinization onset temp. The 10% sol. of DP 3-4 and 6-7 polydextrose fractions were compared to maltotriose, maltotetraose, maltohexaose, and maltoheptaose. The DP 6-7 polydextrose fractions increased the gelatinization onset temp. more than the other sugars. Fractions with DP > 20 resulted in a wide temp. range of starch gelatinization compared to those of DP 3-4, 6-7 and 12-16 fractions. Hydrolyzed  $\beta$ -glucan increased the starch gelatinization onset temp. more than polydextrose at the 20 and 30% levels. AA

2077

Gao (L), Ng (PKW) and Bushuk (W). **Structure of glutenin based on farinograph and electrophoretic results.** *Cereal Chemistry* 69(4): 1992: 452-455

The objective of this study was to obtain additional information on the mol. structure of glutenin in relation to its functionality in doughs during breadmaking. In this context, doughs from the flour of the Canadian hard red spring wheat cv. Katepwa were mixed in a farinograph in the absence and presence of a disulphide reducing agent, dithiothreitol (DTT). The glutenin of the control dough and of the partially reduced dough was examined by sodium dodecyl sulphate-polyacrylamide gel electrophoresis (SDS-PAGE) without and with reduction during electrophoretic analysis. At a low concn. of DTT (20  $\mu$ mol/50 g of flour), the farinograph properties were markedly affected, but no high mol. wt. (HMW) subunits were liberated as indicated by SDS-PAGE without reduction. At higher concn. of DTT (80-3,000  $\mu$ mol/50 g of flour), several types of glutenin subunit oligomers and all of the oligomer subunits (2\*, 5, 7, 9 and 10) were liberated gradually with increasing DTT concn. HMW glutenin oligomers as 3 close-moving bands in SDS-PAGE, with mol. wts. higher than that of the largest HMW subunit (2\*), were observed for doughs treated with the higher concn. of DTT. On the basis of their apparent mol. wts., the three bands appear to be dimers composed of subunits as follows: 2\*+7, 2\*+9 and 5+10. The results of this study are consistent with a "block" model of the molecular structure of glutenin. AA

## MILLETS

## Corn

2078

Mistry (AH), Steinberg (MP) and Eckhoff (SR). **Fractionation of high-lysine corn to produce edible by-products.** *Cereal Chemistry* 69(4): 1992: 433-435

A wet process for high-lysine corn was developed on a pilot scale with the primary objective of producing germ and soluble protein for food. Corn was steeped in lactic acid sol., and a hydraulic shear mill was used to remove whole germs. A floatation column separated the whole germ from the coarsely ground corn. Whole, clean germs were recovered in 8.52% yield. Soluble protein was recovered by conventional tabling, with yields of 6.67%. The soluble protein was high in lysine content. The germs have potential for replacing confectionery nuts. AA

2079

Knutson (CA) and Grove (MJ). **Variability of  $\alpha$ -amylase synthesis in germinating maize.** *Cereal Chemistry* 69(4): 1992: 436-439

$\alpha$ -Amylases from germinating seeds of 5 maize genotypes were isolated by affinity chromatography and chromatofocusing for comparison with enzymes from cv B73, which contains 4 major groups of enzymes separable by these techniques: B-I and B-II have elution pH > 5.0; B-III has elution pH of 4.5 - 4.8; and B-IV has elution pH of 4.0 - 4.1. These 4 groups exhibit 3 specific patterns of hydrolysis on soluble starch, differing primarily in the proportion of degree of polymerization (DP) 2 and DP6 oligosaccharides produced. Enzyme groups found in other cvs were the same as those found in B73, but the amount of synthesis of the different groups varied substantially. Enzymes from each cv were evaluated for hydrolysis of soluble starch. 4 of the genotypes contained substantial amounts of enzyme fractions with an elution pH in the range of 4.3 - 4.5 but with an action pattern different from that of B-III; these fractions appeared to be unable to hydrolyze oligosaccharides smaller than DP8. AA

2080

Fannon (JE) and Bemiller (JN). **Structure of corn starch paste and granule remnants revealed by low-temperature scanning electron microscopy after cryopreparation.** *Cereal Chemistry* 69(4): 1992: 456-460

To determine any correlation between the ultrastructure of corn starch pastes and the functional properties on which their applications are based, starch pastes and granule remnants were plunge-frozen in melting nitrogen and examined by



low-temp. scanning electron microscopy. In all cases, pastes were composed of a continuous phase of bundles of molecules surrounding a discontinuous phase of swollen granule remnants commonly referred to as ghosts. Differences between starches were seen in the amount and size of the continuous phase and in the strength and appearance of the ghosts. Because ghost structure is important to starch paste properties, isolated ghosts were also examined to determine a relationship between ghost structures and functional properties of starches. The ghosts, like the pastes showed structural differences that correlated strongly with the rheological behaviour of each starch type. Low-temp. scanning electron microscopy should be useful as a rapid method for screening starch hybrids with unknown properties because the ultrastructures observed, although they may be somewhat artifactual, correlated with the functional properties of the starch. AA

2081

Antai (SP) and Nzeribe (E). **Suitability of using sieved or unsieved maize mash for production of "OGI" - A fermented cereal food.** *Plant Foods for Human Nutrition* 42(1): 1992: 25-30

Proximate analysis of sieved and unsieved maize mash revealed that there was a decrease in the protein and lipid content of the sieved maize mash as compared to that of the unsieved maize mash. Crude fibre and ash was completely absent in the sieved maize mash, while they were present in the unsieved mash. Chemical analysis of the fermented unsieved maize mash revealed an increase in the protein content from 9.9% (unfermented) to 13.4% after 3 days of fermentation, whereas the protein content of the sieved maize mash increased from 7.1% (unfermented) to 8.4% after the same period of fermentation. Furthermore, the results revealed that the protein content of the fermented unsieved maize mash was 32.1% higher than that of the fermented sieved maize mash indicating that the unsieved maize mash was of better nutrient quality and should be preferred to sieved maize mash for use in "ogi" production. AA

## Proso millets

2082

Delost-Lewis (K), Lorenz (K) and Tribelhorn (R). **Puffing quality of experimental varieties of proso millets (*Panicum miliaceum*).** *Cereal Chemistry* 69(4): 1992: 359-365

Eight experimental var. of proso millet were studied to determine varietal differences in puffing quality. The grains were raised to 12, 15 or 18% moisture, equilibrated for 72 h, and gun puffed at 140 psi.

Significant differences in puffing quality were observed on the basis of puffed yields and expansion volumes. Variety 2027, which demonstrated good puffing quality, was selected for further studies of the physical, nutritional and functional properties of products processed under various puffing conditions. A factorial arrangement of treatments was used. The grains were raised to 12, 15 or 18% moisture, allowed to equilibrate for 72 h, and gun puffed at 120, 140 or 160 psi. Puffing quality was significantly improved when grains were tempered to 15 or 18% moisture and gun puffed at 140 or 160 psi. The puffed products were more highly expanded, less dense, and higher in protein content, but lower in ash and total dietary fiber, than those tempered to 12% moisture or gun puffed at 120 psi. In vitro nitrogen digestibility of the puffed products was adversely affected by low moisture and the intense heat treatments required to reach high pressures. The puffed products demonstrated a much greater rate of in vitro starch digestibility than unprocessed millet. Nitrogen solubility of the puffed products was greatly reduced under all process conditions. AA

## Sorghum

2083

Mulimani (VH) and Supriya (D).  **$\alpha$ -amylase inhibitor activity in sorghum grains. Effects of cooking and UV radiation.** *Journal of Food Science and Technology (India)* 30(5): 1993: 321-323

Cooking and UV radiation decreased the amylase inhibitory activity, the loss of which in pre-soaked sorghum (*Sorghum bicolor* M) seeds after these heat treatments was more drastic than in heat treated raw seeds. Sorghum products - popped sorghum and Idli did not exhibit any amylase inhibitory activity. SD

2084

Mazher (H), Chandrashekar (A) and Shetty (HS). **Isolation and immunochemical characterization of the alcohol-extractable proteins (kafirins) of *Sorghum bicolor* (L) Moench.** *Journal of Cereal Science* 17(1): 1993: 83-93

The differential extractabilities of kafirins were exploited in purifying  $\alpha$ -,  $\beta$ - and  $\gamma$ -kafirins. Polyclonal antibodies were raised against them. Immunoblotting showed no cross reactivity between the 3 kafirins. Nitrogen analysis, sodium dodecyl sulphate polyacrylamide gel electrophoresis (SDS-PAGE), immunoblotting and enzyme linked immunosorbent assay (ELISA) were used to demonstrate the qualitative and quantitative differences between kafirins and cross-linked kafirins. ELISA indicated that increased



extractability of  $\beta$ - and  $\gamma$ -kafirins was responsible for the increase in the total kafirin extracted when reducing agent was added to aqueous *t*-butanol. All 3 kafirin antibodies reacted with specific prolamins from other tropical millets and cereals suggesting homologies amongst the prolamins contained within them. AA

2085

Kavitha (R) and Chandrashekar (A). **Content and composition of nonstarchy polysaccharides in endosperms of sorghums varying in hardness.** *Cereal Chemistry* 69(4); 1992; 440-443

Nonstarchy polysaccharide content and composition in the endosperm of sorghum grains varying in hardness was estimated. Soft grains appeared to contain more water-soluble and water-insoluble nonstarchy polysaccharide, whereas the hard grains contained more cellulose. There was more pentose than hexose and more arabinose than xylose in the water-insoluble nonstarchy polysaccharide in soft grains than there was in hard grains. Similar but more pronounced differences were seen between hard and soft portions of the endosperm within kernels. Varietal differences in nonstarchy polysaccharide content and composition reflected compositional differences between the two endosperm types. The presence of linear hemicelluloses and cellulose in cell walls of the hard grains and hard portions of the endosperm may have contributed to rigidity and strength. AA

2086

Gomez (MI), House (LR), Rooney (LW) and Dendy (DAV). **Utilization of sorghum and millets.** 92-9066-160-7, ICRISAT, Andhra Pradesh-502 324, India. viii+216; 1992

This book is a compilation of 28 papers plus working group discussions concerning policy, practice and potential relating to the uses of sorghum and millets throughout the world. The book has two sections. The first contains the 28 papers, which are grouped into 4 categories: primary processing of food, secondary processing of food, industrial uses and feeds. The second section reports the results of the working group discussions. A description of the methodology used to record the discussion results is followed by the spreadsheets used to obtain them and the overall recommendations of the workshop. CSA

### Sorghum flour

2087

Verbruggen (MA), Beldman (G), Voragen (AGJ) and Hollemans (M). **Water-unextractable cell wall material from sorghum: Isolation and**

**characterization.** *Journal of Cereal Science* 17(1); 1993; 71-82

A procedure for the isolation of water-unextractable cell wall material (WUS) from flours of sorghum and polished sorghum (*Sorghum vulgare* cv. Fara Fara) is described. The composition of all fractions obtained was determined and a mass balance made. For whole grain, as well as for polished sorghum, 87% (dry wt.) of the flours was recovered in the fractions. The analysed components, being mainly starch, protein and non-starch polysaccharides (NSP), accounted for 84-100% (dry wt.) of almost all fractions. For whole grain and polished sorghum, respectively, the WUS fractions accounted for 5.3 and 1.05% of the flour and contained 2.8 and 1.9% starch, 6.8 and 13.9% protein and 73.6 and 61.0% NSP (dry wt.). These NSP were composed mainly of arabinose, xylose, glucose and uronic acid. The polysaccharide composition of the outer layers is similar to that of the inner layers of the sorghum kernel as is seen by comparison of the neutral sugar composition in whole grain and polished sorghum and in the grindings obtained after polishing. Most of the non-starch glucose is present as cellulose and (1-3), (1-4)- $\beta$ -D-glucan. The arabinoxylan present in sorghum is highly substituted (arabinose/xylose-0.9) and contains uronic acids, acetyl and feruloyl substituents. AA

### PULSES

2088

Hoppner (K) and Lampi (B). **Folate retention in dried legumes after different methods of meal preparation.** *Food Research International* 26(1); 1993; 45-48

Twenty-five different samples of legumes were analyzed for total folate. A composite sample of each legume was prepared and assigned to usual cooking time categories, 20, 90 and 150 min. Within each cooking time the legumes were pretreated with a quick soak (brought to a boil and held for 2 min, covered and left to soak for 1 h) and a long soak method (soaked in water overnight for 16 h). The av. folate retention in legumes cooked for 20 and 90 min differed significantly (*p* less than or equal to 0.05). The mean retention for folate in legumes in the 20 min cooking category was 60% without presoak, 18% for quick soak versus 35% for long soak, and for 90 min cooking 31% for quick soak versus 42% for long soak. There was no significant difference (*P* > 0.05) in folate retention between quick (41%) and long soak (44%) pretreatment for legumes in the 150 min cooking category. The results indicate that presoak treatment can affect folate retention in meal prepared from legumes. AA



Bangladesh Agricultural Research Institute (International Development Research Centre International Crops Research Institute for Semi-Arid Tropics). **Advances in Pulses Research in Bangladesh. Proceedings of the Second National Workshop on Pulses.** Joydebpur, Bangladesh. 6th - 8th June, 1989, ICRISAT, Patancheru, A.P., India. ix+254; 1991

Apart from other articles the proceedings also covers articles by Umaid Singh and Jambunathan, R. on pulses as a substitute for animal protein (pp. 191-197, 21 refs); Faris, D. G. and Gowda, C. L. L. on networking and the Asian grain legumes network's role in strengthening pulses research in Bangladesh (pp. 201-206, 6 refs); Jagdish Kumar on the role of ICRISAT in the improvement of chickpea in Bangladesh (pp. 207-213, 12 refs); Reddy, M. V. on integrated control of pulse diseases (pp. 215-220, 4 refs) and Bahl, P. N. on the problems and production in India (pp. 221-222). CSA

2090

Savelkoul (FHMG), Van Der Poel (AFB) and Tamminga (S). **The presence and inactivation of trypsin inhibitors, tannins, lectins and amylase inhibitors in legume seeds during germination. A review.** *Plant Foods for Human Nutrition* 42(1): 1992: 71-85

During the germination of legume seeds, enzymes become active in order to degrade starch, storage-protein and proteinaceous antinutritional factors. The degradation of storage-protein is necessary to make peptides and amino acids available in order to stimulate seed growth and early plant growth. Proteinaceous antinutritional factors such as amylase inhibitors, lectins and trypsin inhibitors are present in legume seeds and protect them against predators. However, during germination, they degrade to a lower level by the action of several enzymes. The effect of germination on the content and activity of amylase inhibitors, lectins, tannins and trypsin inhibitors is discussed. AA

### Chickpeas

2091

van Rheenen (HA), Saxena (MC), International Crops Research Institute for the Semi-Arid Tropics and International Center for Agricultural Research in the Dry Areas. **Chickpea in the Nineties: Proceedings of the Second International Workshop on Chickpea Improvement.** Patancheru, A.P. 4th - 8th December 1989, 92-9066-181-X, ICRISAT, Patancheru, A.P., India. vii+403; 1990

This proceedings covers papers presented by Pimbert, M. P. on some future research directions for integrated pest management in Chickpea: a viewpoint (pp. 151-163); Insect pest problems and recent approaches to solving them on chickpea in South Asia by Ahmed, K. et al (pp. 165-168); Damage/yield relationships due to *Helicoverpa armigera* (Hubner) larvae in chickpea in India by Sehgal, V. K. (pp. 177-179); Host-plant resistance to *Helicoverpa armigera* in different agroecological contexts by Lateef, S. S and Sachan, J. N. (pp. 181-189). CSA

### Cowpeas

2092

Marconi (E), Carnovale (E), Di Nola (A) and Brosio (E). **NMR assessment of water uptake in different *Vigna* spp. seeds.** *International Journal of Food Science and Technology* 28(1): 1993: 25-33

This paper reports a new and advantageous NMR spectroscopic method to study the variations in the uptake of water in different *Vigna* spp. accessions and effect on nutritional quality and insect resistance of cowpea. The time required to reach saturation hydration capacity ranged from 3 to 16 h; the total amount of absorbed water varied from 1.06 to 1.39 g H<sub>2</sub>O g<sup>-1</sup> sample and kinetic constant from 8.2 to 20.4 10<sup>-3</sup> mm<sup>-1</sup>. Accessions with a rough seed coat showed a fast water uptake within the first hour while some accessions with smooth seed coat needed an activation period of 1-5 h. No relationships were observed between kinetic constant, absorbed water and protein content or morphological characteristics. Dehulled wild sp. absorbed water at similar rates to cultivated cowpeas. NMR thus forms a suitable technique to investigate some technological characteristics of legumes related to domestic and industrial processing (cooking, canning). GS

### *Mucuna monosperma*

2093

Arulmozhi (M) and Janardhanan (K). **The biochemical composition and nutritional potential of the tribal pulse, *Mucuna monosperma* DC. ex Wight.** *Plant Foods for Human Nutrition* 42(1): 1992: 45-53

Two germplasms of the tribal pulse, *Mucuna monosperma* DC. ex Wight, viz., (1) Thirunelly Reserve Forest, Wynaad District (Kerala) and (2) Siruvani Reserve Forest, Coimbatore District (Tamilnadu), were analysed for proximate composition, total (true) seed proteins, seed protein fractionation, amino acid composition, fatty acids,



minerals and antinutritional factors. Crude proteins, crude lipids, ash and nitrogen free extractives constituted 23.10%, 4.36%, 3.80%, 61.74% respectively, in Tamilnadu germplasm; whereas, in Kerala germplasm they constituted 20.13%, 8.99%, 3.60% and 61.69% respectively. The calorific values of 100 g dry matter of seed material are 408.19 KCal (Kerala) and 378.60 KCal (Tamilnadu) germplasms. Essential amino acids like methionine, cystine, threonine and valine were found to be limiting in the seed proteins of both the germplasms. The fatty acids like lauric acid and palmitic acid are found to be common in both the germplasm seed samples, while linoleic and oleic acids in Kerala germplasm and stearic acid in Tamilnadu germplasm are present. Tamilnadu germplasm seems to be a rich source of Na, Mg, Zn, Mn, Cu and Fe; whereas the Kerala germplasm seems to be a rich source of phosphorus. Antinutritional substances like total free phenols, tannins, L-DOPA, trypsin inhibitor activity and phytohaemagglutinating activity also were investigated. AA

## Peas

2094

Ben-Hdech (H), Gallant (DJ), Robert (P) and Gueguen (J). **Use of near infrared spectroscopy to evaluate the intensity of extrusion-cooking processing of pea flour.** *International Journal of Food Science and Technology* 28(1); 1993: 1-12

Twenty-five different pea extrudates were produced using a Clextral BC45 twin-screw extruder. Near infrared reflectance (NIR) spectra of the extrudates were recorded between 1100 and 2500 nm. The application of principle component analysis (PCA) on these spectral data permitted discrimination between the extrudates produced under moderate, intermediate or severe conditions of extrusion-cooking. The study of protein quality through solubility experiments, polyacrylamide gel electrophoresis, detn. of available basic amino acids and brown colour measurement showed that, under moderate conditions of extrusion-cooking, protein was only slightly affected. All protein subunits could be restored after solubilization in phosphate buffer containing a detergent and a reducer of disulphide bonds. However, under severe conditions of extrusion-cooking, the extrudates exhibited a relatively intense brown colour and all protein fractions were implicated in non-disulphide covalent bonds and underwent some macromolecular degradation. Therefore, the spectral discrimination between pea extrudates which was related to the processing parameters, could also be related to the degree of transformation of these extrudates. Thus, the method may be used to classify an extrudate produced under unknown

conditions by projecting its spectrum on the similarity maps obtained by PCA on a known collection of extrudates. AA

## Pigeon peas

2095

Verma (P), Saxena (RP), Sarkar (BC) and Omre (PK). **Enzymatic pretreatment of pigeon pea (*Cajanus cajan* L.) grain and its interaction with milling.** *Journal of Food Science and Technology (India)* 30(5); 1993: 368-370

Max. hulling efficiency of 88.93% was obtained at 0.08 g of total enzyme protein content mixed in 260 g of pigeon pea grain. The optimum levels of enzymatic hydrolysis parameters - were incubation temp. 46.5°C, treatment period 12.7 h and moisture content of grain 26.6% w.b. SD

## OILSEEDS AND NUTS

### Almonds

2096

Berry (SK), Sehgal (RC) and Teotia (MS). **Studies on green almonds-variatal characteristics.** *Beverage and Food World* 19(5); 1992: 54-55

Green almonds (*Prunus amygdalus* Batsch) were examined for their physicochemical characteristics with respect to fruit size and varietal differences. Fruit size in general, did not show any marked differences in physical parameters of the fruit and chemical composition of the kernel. The var. Bruce, Local Selection and Local Selection Guara contained thick, hard shells and the kernels possessed bitter taste. The oil and protein content of the 8 var. analysed varied between 32 to 39% and 33 to 38% respectively. There was wide variation in total sugars content among the var. Prianyag and Tree no. 14 were considered more desirable because of ease in breaking open the shell, high kernel recovery, high av. kernel wt., thin kernel skin and appealing mild sweet taste. AA

### Bambara nut

2097

Obizoba (IC) and Egbuna (HI). **Effect of germination and fermentation on the nutritional quality of bambara nut (*Voandzeia subterranea* L. Thouars) and its product (milk).** *Plant Foods for Human Nutrition* 42(1); 1992: 13-23



Five cvs of bambara groundnut were selected on which to study the effects of germination and fermentation on their proximate composition. The cv. that had the highest protein content was chosen to prepare unfermented and fermented milk. Standard assay techniques were adopted to determine the parameters selected for use. Germination caused a decrease in the protein, carbohydrate and starch, it increased sugar content, and had varied effects on the lipids contents of the dry samples. The anti-nutritional factor-tannin concn. was decreased. Germination and fermentation had varied effects on the nutrient compositions of the milk. Compared to the control, germination had the same effect as in the seeds. Fermentation further decreased some of the nitrogenous constituents, sugar and starch content of the milk and much drastically the tannin content. Hydrolysis and other metabolic changes freed the nutrients from their bound forms while decreasing the quantity, but increasing the quality and availability of the nutrients. AA

## Coconuts

2098

Cherian (S) and Chandrasekharan Nair. **Changes in nutrient content of coconut water as a result of root (wilt) infection.** *Madras Agricultural Journal* 80(9); 1993; 537-540

Eight month old coconuts affected by root (wilt) disease were analysed for their nutrient contents. The total sugar content varied only slightly from 2.02 to 2.20 g/100 ml. The amino acid content which varied from 96.32 to 113.50 mg/100 ml coconut water was the lowest at the initial stage of the disease and increased with the disease. Ash content which varied from 0.564 to 0.439 g/100 ml of coconut water decreased with increase in disease. Na content varied from 268 to 232 mg/100 ml, K from 194 - 221 mg/100 ml, Ca from 15.63 to 22.45 mg/100 ml, Mg from 9.89 to 13.39 mg/100 ml and P content from 6.36 to 9.44 mg/100 ml of coconut water towards the advanced stage of the disease. GS

## Cottonseeds

2099

Sanni (AI) and Ogbonna (DN). **Biochemical studies on Owoh - a Nigerian fermented soup condiment from cottonseed.** *Food Microbiology* 9(3); 1992; 177-183

The effect of fermentation on the biochemical composition of cotton seed and the fermented product owoh is reported. There was a reduction in the gossypol content of cotton from 0.055 mg g<sup>-1</sup> in the unfermented seed to 0.015 mg g<sup>-1</sup> in the

fermented product. Apart from K, an increase in all the mineral elements in owoh was obtained, while a decrease in the values of total lipids, ash and crude fibre was recorded. A decrease in the total nitrogen and protein is also reported. Enzyme activities during fermentation revealed an initial increase in amylase activity with a peak at 12 h followed by a sharp decline at 24 h. For proteinase, high activity culminating in a peak at 24 h and a decline at 48 h was observed. However, there was a gradual increase in the lipase activity until the end of fermentation. AA

## Groundnuts

2100

Evrantz (EO). **The effects of temperature and moisture content on lipid peroxidation during storage of unblanched salted roasted peanuts: Shelf-life studies for unblanched salted roasted peanuts.** *International Journal of Food Science and Technology* 28(1); 1993; 193-199

The effects of temp. and moisture content on fat oxidation (peroxide value) during storage of commercial unblanched salted roasted peanuts were investigated by storing 1.4 plus or minus 0.02% moisture samples at 15, 25, 35 and 1.4 plus or minus 0.02%, 2.2 plus or minus 0.04%, 2.86 plus or minus 0.03%, 3.9 plus or minus 0.06% moisture samples at 35°C. Oxidation took place even at low temp. and the rate of oxidation was especially accelerated at high temp. The Q<sub>10</sub> value for peroxidation was calculated as 1.60 from the shelf-life plot (r = 0.821). The accelerated shelf-life test at various moisture contents showed rate of peroxide formation is decreasing near or above BET monolayer value, 2.13%, calculated from the BET equation (r = 0.997) and then increasing with further increase in moisture content. In order to prevent the loss of desirable crispness of the product BET monolayer value is proved to be the most suitable for extending shelf-life. AA

2101

Hamaker (BR), Valles (C), Gilman (R), Hardmeier (RM), Clark (D), Garcia (HH), Gonzales (AE), Kohlsted (I), Castro (M), Valdivia (R), Rodriguez (T), Lescano (M). **Amino acid and fatty acid profiles of the Inca peanut (*Plukenetia volubilis*).** *Cereal Chemistry* 69(4); 1992; 461-463

The Inca peanut (IP), *Pl. volubilis*, is a potential new crop indigenous to the high-altitude rain forests of the Andean region of South America. It grows as a vine and produces seeds that have a nutlike appearance and contain high amounts of oil (54%) and protein (27%). Amino acid analysis of the protein showed relatively high levels of cysteine.



tyrosine, threonine, and tryptophan compared to other oilseed proteins found in the region. The IP protein is comparable to soy protein in its content of total essential amino acids and, if well digested, would compare well to the FAO WHO/UNU amino acid scoring pattern, being marginally deficient only in lysine (43 vs. 58 mg/g of protein) and leucine (64 vs. 66 mg/g of protein). The oil contains high levels of linoleic and linolenic acids. AA

2102

Mehan (VK), McDonald (D), Haravu (LJ) and Jayanthi (S). **The groundnut aflatoxin problem review and literature database.** ICRISAT, Patancheru, Andhra Pradesh-502 324, India. vi+387; 1991

Contains reviews of important aspects of the groundnut aflatoxin problem together with annotated bibliographies. Aspects covered include aflatoxicosis in animals and humans; research on aflatoxin contamination of groundnuts; biochemical changes in groundnuts; factors affecting production of aflatoxin in groundnuts in the laboratory; aflatoxins in groundnut and groundnut products; limits and regulations on aflatoxins; methods for aflatoxin analysis and management of aflatoxin contamination. CSA

## Soybeans

2103

Kulkarni (SD), Bhole (NG) and Sawarkar (SK). **Spatial dimensions of soybeans and their dependence on grain moisture conditions.** *Journal of Food Science and Technology (India)* 30(5): 1993; 335-338

Spatial dimensions of soybean grains were determined for each lot at different moisture contents up to 114% d.b. A typical phenomenon of increase in dimensions was observed. Grain length increased by over 60%, whereas the changes in breadth and thickness were about 20 and 16%, respectively for increase in moisture content up to 114% d.b. In addition, about 18% decrease in grain sphericity, 26% increase in size and over 90% increase in 1000 grain mass were observed. These major changes in the longitudinal direction alone would lead to increase in aerodynamic properties of the material. The data, thus, indicate the need to design the individual system for each moisture content range of the soybeans. AA

2104

Kanekar (P), Joshi (N), Sarnaik (S) and Kelkar (A). **Effect of fermentation by lactic acid bacteria from soybean seeds on trypsin inhibitor (TI) activity.** *Food Microbiology* 9(3): 1992; 245-249

*Lactobacillus plantarum*, *Streptococcus lactis* and *Pediococcus halophilus* constituted the lactic flora of soybean seeds. Fermentation of soy flour mixed with Bengal gram flour for 18 h at 30°C resulted in a decrease in TI activity by 5.77% and yielded a fermented food soy-dhokla. The effect of fermentation by *L. plantarum* on TI activity from nutrient medium amended with TI and from soy flour showed decrease in TI activity of 4.7% in nutrient medium and 5% in soy flour. Since the soy flour had native lactic flora, the fermented food product could be obtained without addition of curds. This is an advantage of soybean for introduction in the fermented foods. SRA

2105

Mohamed (AI) and Rangappa (M). **Screening soybean (grain and vegetable) genotypes for nutrients and anti-nutritional factors.** *Plant Foods for Human Nutrition* 42(1): 1992; 87-96

Fifty six genotypes of grain-type soybean and 17 genotypes of vegetable-type soybean collections were analyzed for protein and oil content, trypsin inhibitor, and lipoxigenase activities. The protein and oil content ranged from 36.9 to 47.9% and from 13.3 to 23.0% for different accessions in grain- and vegetable-type soybeans, respectively. Trypsin inhibitor and lipoxigenase activities ranged from 22.0 to 47.0 trypsin inhibitor units/mg meal and from 482 to 6265 lipoxigenase units/min/mg meal for grain- and vegetable-type soybeans, respectively. Significant correlations ( $r = -0.62$  and  $-0.52$ ,  $P < 0.05$ ) were found between protein and oil, and between protein and trypsin inhibitor. A significant positive correlation ( $r = 0.42$ ,  $P < 0.05$ ) was also calculated for oil and lipoxigenase activity. Several genotypes of soybean and vegetable soybean (plant introductions 423905, 417330, 47223, 171451, 200506, 200523, 417124, 227687, 203402, 445842, 203399, 423852, 416771, FC 31927, Avoyelles and Sooty) showed good nutritional potential and may be useful in a breeding program to improve the nutritional quality of soybean. Screening for essential amino acids, fatty acids, and trace minerals for selected genotypes is underway. AA

## Sunflower seeds

2106

Rovedo (CO), Aguerre (RJ) and Suarez (C). **Measuring and modelling the water vapour desorption in sunflower seed.** *International Journal of Food Science and Technology* 28(2): 1993; 153-158



Water activities of sunflower seed (whole), hull and endosperm were measured at 25, 40 and 50°C and different moisture contents by means of an electronic  $a_w$ -meter in the range 0.199 - 0.867. Based on the equilibrium between the water in air and a constant moisture specimen, the method permits a direct measurement of the isosteres and was used to estimate the variation of the isosteric heat with moisture content. In the range of temp. investigated it was found that the isosteric heat is practically independent of temp. The hygroscopic equilibrium data of the different materials were modelled by a BET-type two parameter isotherm for the whole range of  $a_w$  investigated. AA

## TUBERS AND VEGETABLES

### Root vegetables

#### Carrots

2107

Reiss (J). **Reduction of nitrate in carrot juice by immobilized cells of *Staphylococcus carnosus*.** *Deutsche Lebensmittel-Rundschau* 88(11); 1992; 352-353

Various concn. of lyophilized *Staph. carnosus* cells were immobilized in Ca-alginate and anaerobically incubated in carrot juice with an addition of 1 g sodium nitrate per liter. Nitrate, nitrite and pH were determined continuously during the incubation period of 5 h at 30°C. The optimal bacterial concn. was 0.5 g/100 ml juice, leading to a reduction rate of 28% after 4 h. Nitrite was never found during the incubation; the pH value was between 6.7 and 7.1 *Staph. carnosus* must be considered to be "food-safe" but its use for reducing the nitrate level in carrot juice is restricted by the relatively low degradation rate. AA

#### Cassava

2108

Gidamis (AB), O'Brien (GM) and Poulter (NH). **Cassava detoxification of traditional Tanzanian cassava foods.** *International Journal of Food Science and Technology* 28(2); 1993; 211-218

Four methods for processing cassava roots and one for leaves, all traditional in Tanzania, were evaluated for their effectiveness in removing the 3 types of cyanogens present by using a modification of the enzymic colorimetric method of Cooke (1978). All 4 root methods reduced cyanogens substantially by 90-98%, and in 3 the main residual cyanogen was cyanohydrin. The least effective method was dry

('solid state') fermentation. The processing stages of comminution and slow drying were most effective for cyanogen removal. In fresh cassava leaves pounding reduced cyanogens by 86%, and subsequent boiling reduced the level to 96% of the initial value. AA

### Vegetables

2109

Garg (N), Churey (JJ) and Splittstoesser (DF). **Microflora of fresh cut vegetables stored at refrigerated and abuse temperatures.** *Journal of Food Science and Technology (India)* 30(5); 1993; 385-386

The microflora of commercially packaged spinach, cauliflower and carrots was compared after storage for 7 days at 3.3 and 15°C. Storage at 15°C produced significantly high aerobic counts in spinach, cauliflower florets and carrot sticks, but not in cauliflower heads and whole carrot. Psychrotrophic species made up a significant proportion of the microflora at both the temp. Little growth of coliform and lactic acid bacteria was observed at either temp. AA

2110

Muller (H). **Determination of folic acid contents in vegetables and fruits by means of high-performance liquid chromatography (HPLC).** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 196(2); 1993; 137-141 (De)

The folic acid content of vegetables (including potatoes) and fruits was determined by means of HPLC. Free folate (monoglutamate forms) and total folate (monoglutamate + polyglutamate forms) are differentiated. Vegetables contained 27-187 µg/100 g and fruits 10-80 µg/100 g total folate. The free folate portion ranged from 6.3% to 96.8% (mean 35%) in vegetables and from 11.6% to 89.0% (mean 56%) in fruits. In addition, the results of the quantification of the main folate derivatives tetrahydrofolic acid (THF), 5-methyltetrahydrofolic acid (5-CH<sub>3</sub>-THF) and 5-formyltetrahydrofolic acid (5-CHO-THF) are presented. The mean values were 70% 5-CH<sub>3</sub>-THF, 20% 5-CHO-THF and 10% THF. Their total, resulting, is comparable with the results of microbiological methods reported in the tables of nutritive values. AA

### Leafy vegetables

2111

Chiriotti Editori. **Proceedings of the Third International Conference on Leaf Protein Research.** Italy-Pisa, Perugia, Viterbo. 1st - 7th



Some of the papers covered in the proceedings are World small-scale operation plants by Joshi, R. N. (pp. 206-209); Sugar beet tops - protein extractions and nutritional evaluation by Barik, S. and Matal, S. (pp. 231-236); Presentation and acceptability of food preparations containing leaf protein conc. by Mathur, B. and Joshi, R. N. (pp. 246-252); Selection and health status of 2 different communities for a possible acceptance trial of leaf protein: A pilot study of Gupta, S. S. and Matal, S. (pp. 308-314); Vegetable protein hydrolysate utilization for human use by Savangikar, G. (pp. 340); Liver enzyme levels and kidney transaminase levels in albino rats fed diets based on wheat flour and wheat flour supplemented with agathi (*Sesbania grandiflora*) leaf protein conc. by Govindan, S., Shanmugasundaram, E. R. B.; and Radhashanmugasundram, K. (pp. 345); Leaf protein as a technology aid to cover basic human needs by Devadas, R. P.; and Vijayalakshmi, P. (pp. 354-359); Challenges in Commercialisation of microalgae by Venkataraman, L. V. and Becker, E. W. (pp. 404-411); Leaf protein conc. from mulberry (*Morus alba* L.) tree leaves by Srivastava, G. P. and Mohan, M. (pp. 412-415); Potential protein fractionation and its by-products from vegetable crop wastes by Bhattacharya, B. (436-439); Economic factors responsible for profitable commercial leaf protein production by Savangikar, V. A. (pp. 500); Cholorococcalean algae for utilisation as a source of proteins by Srivastava, P. and Dadheech, P. K. (pp. 502); Studies on some properties of algal proteins by Dua, S., Kaur, M. and Ahluwalia, A. S. (pp 502). CSA

## Endives

2112

Morris (CE) and Lucotte (T). **Dynamics and variability of bacterial population density on leaves of field-grown endive destined for ready-to-use processing.** *International Journal of Food Science and Technology* 28(2): 1993: 201-209

To quantify the variability and dynamics of bacterial populations on field-grown broad-leaved endive (*Cichorium endiva* cv. Samy) destined for ready-to-use processing, plants were sown at 3 dates in 1990 for cultivation during the autumn season in Southern France. Densities of populations of total, fluorescent pseudomonad and pectolytic bacteria were determined for entire seedlings in the greenhouse and for outer and inner leaves of plants in the field throughout the season until harvest. On seedlings from the greenhouse, bacteria were always detected but fluorescent and pectolytic bacteria were only sporadically detected and generally composed less than 0.1% of the total

population. In the field there were significant differences in total, fluorescent and pectolytic bacterial populations on outer and inner leaves among different plants of the same age, and among inner leaves sampled at the 3 different dates of harvest. The variability observed suggests that it is reasonable to pursue development of cultural or industrial sorting methods to reduce the microbial load of endive destined for ready-to-use processing. AA

## Tomatoes

2113

Saini (SPS) and Singh (S). **Thermal processing of tomato juice from new hybrids.** *Research and Industry, India* 38(3): 1993: 161-164

Five new high yielder tomato hybrids namely NH-15, NH-25, NH-2476, NH-3025 and NH-3027, and one new non-hybrid 1.7 - 1.1 cv were tested for processing into juice. Physico-chemical changes occurring as a consequence of thermal processing were also recorded. Reducing sugars improved slightly. Acidity changed marginally with pH remaining constant. Ascorbic acid was the maximum sufferer with 9.92% loss. Pectin, tannin and ash did not change. High amount of lycopene (4.56 mg/100 g) remained unaltered showing thermal stability of tomato carotenoids. 1.7 - 1.1 cv measured highest value of 30 for Tintometric red colour. Physico-chemical analysis of fresh and processed juices followed by sensory evaluation of packed product established the superiority of new promising cv. for converting into juice over the standard processing var. of Punjab chuhara. AA

2114

Bergeuin (M), Heureux (GPL) and Willemot (C). **Tomato fruit chilling tolerance in relation to internal atmosphere after return to ambient temperature.** *Hortscience* 28(2): 1993: 138-140

Mature-green 'vedette' tomato (*Lycopersicon esculentum* Mill) fruit were stored with (+P) or without (-P) peduncles at 1°C and subsequently returned to 20°C (ambient temp.). The influence of fruit internal atm. composition on chilling injury (CI) symptom development was examined. The +P fruit accumulated > 4% CO<sub>2</sub> and eventually developed CI. As +P fruit chilled for 6 days and returned to ambient temp. did not develop CI symptoms. The -P fruit were largely unaffected and ripened normally at ambient temp. The CO<sub>2</sub> content of -P fruit internal atm. was significantly lower than in +P tomatoes after return to ambient temp. The peduncle scar has a greater permeability to gases than the skin and facilitates gas exchange with external atm. SRA



2115

Torreggiani (D). **Osmotic dehydration in fruit and vegetable processing.** *Food Research International* 26(1): 1993; 59-68

The basic principles which control osmotic dehydration of fruit and vegetables are reported together with the most important parameters and their influence on the process. The effects of osmosis as a pre-treatment, mainly related to the improvement of nutritional, sensorial and functional properties of the products, are analyzed. The distinctive aspect of this process, when compared to other dehydration methods is the 'direct formulation' achievable through the selective incorporation of solutes, without modifying the food integrity. By balancing the two main osmotic effects, water loss and soluble solids uptake, the functional properties of fruit and vegetables could be adapted to many different food systems. Present application of the process are shown and problems related to a further industrial development are analyzed. AA

2116

Charan (R) and Sharma (GP). **Fruit preservation through controlled atmosphere.** *Beverage and Food World* 19(5): 1992; 25-26

Briefly discusses biochemical aspects, biosynthesis and effect of ethylene, and controlled atm. storage. BV

2117

Georges (AN) and Simard (RE). **Characteristics of juice from palmyrah palm (*Borassus*) fruit.** *Plant Foods for Human Nutrition* 42(1): 1992; 55-70

The ancestral palmyrah palm (*Borassus aethiopum* Mart.) produces in the V-Baoule region of Cote d'Ivoire, sweet and fragrant fruits in large numbers. Most of these spoil in the bush when ripe. The present work was to develop an efficient process for the extraction of juice from these fruits using a pectinase (Pectinex Ultra SP-L) at different concn. (0.2, 0.4 and 0.6 mg/kg), temp. (25, 35 and 45°C), and for different time (30, 60, 90 and 120 min). Some physico-chemical characteristics of the juice were determined in order to evaluate the quality of the product. Treatment of 45°C for 120 min at an enzyme concn. of 0.6 mg/kg was selected for highest juice yield (73.14%). The colour parameters (L: a: b) fluctuated in intensity between batches of rehydrated material. Juice consistency was found to be stable at 45°C at the enzyme concn. used.

There was a slight variation in pH among the different treatments. In general, the yield and quality of the juice obtained were affected by treatment temp., enzyme concn. and maceration time. AA

## Apples

2118

Luo (Y), Patterson (ME) and Swanson (BG). **Scanning electron microscopy structure and firmness of papain treated apple slices.** *Food Structure* 11(4): 1992; 333-338

Textural changes by Instron showed that McIntosh apple slices submerged for 24 h in 1% papain sol. were significantly firmer than the control submerged in distilled water. A significantly smaller decay index observed in slices submerged in papain for 3-4 days than the control slices. SEM data revealed less severe cell wall breakdown in slices treated with papain sol. and the cell structure in 18 h treated slices was unaffected while the cells in control slices collapsed. SD

2119

Gussman (CD), Goffreda (JC) and Gianjagna (TJ). **Ethylene production and fruit softening rates in several apple fruit ripening variants.** *Hortscience* 28(2): 1993; 135-137

Ethylene production and fruit firmness were compared during postharvest storage using 3 numbered selections (NJ55, D101-110, and PA14238) and 2 commercial apple cvs ('Red chief delicious' and 'Golden delicious') as standards. PA14238 and D101-110 produced < 10  $\mu\text{kg}^{-1}\text{h}$  ethylene level at harvest and throughout most of 86 days of storage at 4°C. Commercial cvs produced > 100  $\mu\text{l}$  ethylene/kg/h during the same time period. PA14238 and D101-110 flesh disks converted aminocyclopropane-1-carboxylic acid (ACC) but not methionine to ethylene. 'Red chief delicious' readily converted both methionine and ACC to ethylene at the end of cold storage. PA14238 fruit were the firmest and D101-110 fruits softened during post harvest storage. NJ55 did not produce ethylene at harvest, but produced a significant amount of ethylene (90  $\mu\text{kg}^{-1}\text{hr}$ ) during storage. Despite its high capacity to produce ethylene, NJ55 remained firm at the end of cold storage. SRA

## Limes

2120

Thangaraj (T). **Effect of pre-storage dip treatments of fungicides and 2,4-D in the extension of**

The influence of certain fungicides and 2,4-D as pre-storage dips on the shelf-life of acid lime fruits was studied. The changes in physiological loss of wt. (PLW), juice content, peel content, TSS, acidity and ascorbic acid were recorded. PLW showed no significant deviations among treatments. Treatments 2,4-D 50 and 100 p.p.m. were superior to other treatments and showed higher % of marketable fruits (80.3 and 86.3%) as compared to 34.6% in untreated fruits. The treatments did not alter any of the quality components. GS

2121

Thangaraj (T) and Irulappan (I). **Effect of skin coatings, 2,4-D and prepacking on the shelf-life of acid lime fruits.** *Madras Agricultural Journal* 80(3); 1993; 139-142

The extension of the shelf-life of acid lime with skin coating, 2,4-D and prepacking either alone or in combinations was experimented. The physiological loss of wt. ranged from 0.8 to 11.4%; the marketable shelf-life varied from 5.3 days (2,4-D 100 p.p.m.) to 25.3 days (2,4-D 100 + frutox 4 + prepackaging). Prepackaging enhanced the shelf-life upto 17 days. The intensity of storage decay was of higher order (18.3) in frutox 4% + prepacking. Ascorbic acid level varied from 20.00 to 33.43 mg. A slight reduction in peel content was recorded in frutox 4, frutox 8, 2,4-D, 2,4-D + frutox 4 and prepacking treatments. The juice content increased slightly in all the treatments involving 2,4-D either alone or in combination with frutox. GS

## Mangoes

2122

Ranote (PS), Bawa (AS) and Saini (SPS). **Thermal process for mango pulp.** *Research and Industry, India* 38(3); 1993; 150-151

A study was conducted to determine the process time for processing of Dusehri mango pulp in polypropylene pouches (300 gauge, 15 cm x 10 cm) and glass bottles (200 ml). The heat penetration in bottled as well as pouched mango pulp took place by conduction and the slowest heating point was at the geometric centre. Peroxidase in mango pulp was taken as the test enzyme for calculating thermal inactivation and process times. The process time calculated using improved graphical interpolation method was found to be 23 1/2 and 26 min for pouched and bottled pulps respectively. AA

## CONFECTIONERY, STARCH AND SUGAR

2123

Flint (SI) and Camire (ME). **Recovery of lignin during nonstarch polysaccharide analysis.** *Cereal Chemistry* 69(4); 1992; 444-447

Lignin occurs naturally with nonstarch polysaccharides (NSP) in plants and may possess physiological functions when consumed. Since NSP methodology does not include lignin, the dietary fiber values obtained using this method may be lower than AOAC total dietary fiber values for foods containing lignin. Therefore the residue from NSP analysis of 11 foods was recovered gravimetrically and compared with apparent lignin determined by both Klason and permanganate methods. Whereas the NSP residue value was generally higher than values obtained by these methods, correlation was high ( $r = 0.86$ , Klason;  $r = 0.91$ , permanganate). Residue recovery from finely ground AACC wheat bran was significantly lower ( $P < 0.05$ ) from bran that passed a no. 20 or no. 10 screen. Toasting did not affect residue recovery from whole wheat bread. The recovery of lignin during NSP analysis represents savings in time and reagents over separate analysis for lignin. AA

## Starch

2124

Padmanabhan (S) and Ramakrishna (M). **Methods of estimation of starch. A critical appraisal.** *Journal of Food Science and Technology (India)* 30(5); 1993; 313-320

Available estimation methods, factors affecting their reliability, merits and limitations are reviewed. Even though enzymatic method is most accurate, acid hydrolysis method is widely used. 66 references. SD

2125

Jane (J), Xu (A), Radosavljevic (M) and Seib (PA). **Location of amylose in normal starch granules. I. Susceptibility of amylose and amylopectin to cross-link reagents.** *Cereal Chemistry* 69(4); 1992; 405-409

When granular starch was cross-linked, more amylopectin than amylose molecules were found cross-linked. For example, when corn starch was treated with cross-linking reagent (0.07% epichlorohydrin) (pH 10.5 for 24 h), 91% of its amylopectin and 45% of its amylose became insoluble. Cross-linking of pregelatinized and dispersed starch caused less difference in the proportion of soluble amylose and amylopectin than



did the cross-linking of native granular starch. After the starch had been cross-linked in the granular form, gel-permeation chromatograms showed no increase in the size of amylose as a result of cross-linking between two or more amylose molecules. However, susceptibility of the amylose to sequential hydrolysis by isoamylase and  $\beta$ -amylase decreased. The relative blue values of amylopectin peaks indicated that amylose was cross-linked to amylopectin. This was confirmed when the amylopectin isolated from cross-linked starches was debranched with isoamylase. These results are consistent with the view that amylose is interspersed among amylopectin molecules in corn and potato starch granules. AA

## Sugars

2126

Gopalarao (C), Singh (CP) and Bhatnagar (AP). **Optimum operating time for cleaning of cane sugar juice evaporators in sugar mills.** *Journal of Food Science and Technology (India)* 30(5); 1993; 349-354

The overall heat transfer coeff. which decreased with time of operation of evaporators showed straightline relationship under the operating conditions tested, the optimum operating time for max. heat transfer in  $k_1$  and  $k_3$  evaporators was 1800. Evaporator cleaning once during the crushing season is sufficient at saving of nearly 50 tonnes of bagasse, detergents as well as increasing the life of evaporators. SD

2127

Harada (T), Suzuki (S), Taniguchi (H) and Sasaki (T). **Characteristics and applications of a polyfructan synthesized from sucrose by *Aspergillus sydowi* conidia.** *Food Hydrocolloids* 7(1); 1993; 23-38

The present paper describes the physical characteristics and application of polyfructan synthesized from sucrose by *Asp. sydowi* conidia. The polyfructan a white powder with no taste and flavour, can be used as a dietary fiber, as a low calorie bulking agent for sweeteners such as aspartame, or as a fat substitute in various processed foods like ice cream and baked cheese cake. BV

2128

Lim (H), Setser (CS) and Paukstelis (JV). **Comparisons of water mobility using  $^{17}\text{O}$  nuclear magnetic resonance for four sugars: Glucose, maltose, maltotriose, and sucrose.** *Cereal Chemistry* 69(4); 1993; 387-390

Water mobility in wheat starch-sugar (glucose, maltose, maltotriose, and sucrose)-water dispersions was observed as temp. was increased from 35 to 87°C by measuring the transverse relaxation rate ( $R_2$ ) from the  $^{17}\text{O}$  nuclear magnetic resonance spectra. The changes of water mobility with different sugar dispersions exhibited similar patterns. The temp. at which the  $R_2$  max. occurred and the magnitude of the  $R_2$  max. both increased as mol. wt. of sugars and concn. of dispersions were increased. Structural differences appeared to influence the rate of water mobility changes at the same mol. wt. Limited starch granule swelling seemed to occur with the 20% starch-1.5 M maltotriose-water dispersion and influenced the changes of  $R_2$ . AA

## BAKERY PRODUCTS

2129

Vaidehi (MP), Sreelakshmi and Mushtari Begum (J). **Effect of iron-enriched baked products on body weights and haemoglobin levels of slightly anaemic and normal subjects.** *Journal of Food Science and Technology (India)* 30(5); 1993; 357-358

Enriched baked products - shepu bars, ragi rings, toffee bars, jaggery cake, ragi cake, fruit cake, pizza, brown bread, masala bun, speciality egg and enriched puff were developed by incorporating iron-rich foods, ferrous sulphate at 7.5 mg of iron/100 g of product to give 75% recommended dietary allowance as food supplement. All enriched products, being acceptable to normal and anaemic subjects, given as supplementation for 2 months. Greater increase in haemoglobin levels of anaemic subjects and equal increase in body wt. were observed. SD

2130

Natesan (V), Chakrabarty (TK) and Arya (SS). **Studies on ready-to-eat flakes and snack products from sorghum.** *Beverage and Food World* 19(5); 1992; 43-45

Breakfast cereal flakes and ready-to-eat snack food based on sorghum were developed. The principal steps involved are milling, pre-treatment, cooking, partial dehydration, flaking, drying, roasting and packaging. Both the products were found to be highly acceptable. Both the products remained stable for one year when packed in paper - Al. foil-polyethylene laminate, polyethylene and polypropylene pouches and stored at room temp. and 37plus or minus 1°C. Available lysine content did not change during milling of sorghum but its concn. in flakes was higher due to milk powder



incorporation. Concn. of available lysine in sorghum snack was slightly lower due to loss during frying operation. AA

2131

Lawton (JW). **Viscoelasticity of zein-starch doughs.** *Cereal Chemistry* 69(4); 1992; 351-355

Corn flour, when hydrated, does not form a viscoelastic dough as does wheat flour. Yet when mixtures of zein and corn starch were blended into a composite flour and mixed in a farinograph at 25, 30 and 35°C, viscoelastic doughs resembling those of wheat flour were produced. The properties of such doughs appear to result from zein fibres, produced during mixing, that are similar in appearance to wheat glutenin fibres. Dough properties were affected both by mixing temp. and final dough temp. A zein-starch dough could not be produced when mixed below 25°C, and the viscoelasticity of doughs produced at higher temp. was lost if doughs cooled to below 25°C. This temp. (25°C) is closely related to zein's glass transition temp. AA

2132

Autio (K) and Sinda (E). **Frozen doughs: Rheological changes and yeast viability.** *Cereal Chemistry* 69(4); 1992; 409-413

Stress-relaxation and small deformation oscillatory techniques were used to study the rheological changes in doughs subjected to freezing and thawing. Relative to fresh doughs, the relaxation modulus and relaxation time both decreased. Plots of storage modulus ( $G'$ ) and  $\tan \delta$  versus temp. showed a decrease in  $G'$  an increase in  $\tan \delta$ , and an increase in the onset temp. of starch gelatinization in frozen and thawed doughs. Yeast viability was studied by measuring the gas vol. of the dough. The viability decreased slightly during 2 wks of storage at -18°C. Dead yeast cells did not affect the rheological properties of the doughs. AA

## Bread

2133

Payannavar (CS), Singhal (RS) and Kulkarni (PR). **Studies on bread-making from sprouted wheat.** *Research and Industry, India* 38(3); 1993; 138-143

The ability of trisodium phosphate (TSP) and disodium hydrogen phosphate (DSHP) to suppress the  $\alpha$ -amylase activity, changes in terms of hot paste viscosities of wheat flour slurries in water and the effect of incorporating TSP and DSHP in blends of undamaged and sprouted wheat flour were studied. DSHP decreased the activity of purified  $\alpha$ -amylase

steadily with increase in its concn. from 10-100 m mol/ml. The activity decreased rapidly to < 40% with increase in concn. of TSP upto 30 m mol/ml beyond which the activity decreased slowly to < 20% at 100 m mol/ml. These changes were due to inactivation of  $\alpha$ -amylase by the phosphate salts. Breads made from sprouted wheat flour blends (20 and 50%) had very low overall acceptability. The use of DSHP, mixture of TSP and DSHP, and TSP improved the baking quality of flour containing sprouted wheat. GS

2134

Scanlon (MG), Zhou (H-M) and Curtis (PS). **Tristimulus assessment of flour and bread crumb colour with flours of increasing extraction rate.** *Journal of Cereal Science* 17(1); 1993; 33-45

The changes in flour colour with extraction rate, the significance of flour colour measurements in relation to the deterioration in the baking performance of the flours, and crumb colour changes due to increased extraction rate, were assessed using flours from 3 commercial mills. Reproducible decreases in flour Z value were observed before baking performance was affected. Flour Z measurements did not appear to be as accurate as GCF in detecting the addition of individual machine flours. Differences in absolute Z values were observed both due to mills and measuring instruments. GS

2135

Panozzo (JF), Hannah (MC), O'Brien (L) and Bekes (F). **The relationship of free lipids and flour protein to breadmaking quality.** *Journal of Cereal Science* 17(1); 1993; 47-62

Fourteen cvs of wheat of diverse wheat quality were grown over two seasons using 6 rates of applied N fertilizer. The relationships between protein and hexane extractable (free) lipid in flour together with the effects of year and grain hardness on breadmaking quality were investigated. As expected, there was protein response to the fertilizer treatments with the magnitude dependent upon grain hardness and year (or initial soil fertility). Free lipid response was independent of applied N and only weakly correlated with protein concn. of the grain. Hard-grained cvs had higher levels of free lipid than the softer grained wheats. Both flour protein and free lipid had a significant effect on loaf vol., the effect of free lipid remaining significant after adjustment for protein. A regression model was developed for prediction of loaf vol. in terms of flour protein and free lipid and tolerance limits calculated to quantify the precision of prediction. For example, a sample with free lipids = 0.12 g/10 g and protein = 10.0% has predicted loaf vol. of approx. 1645 ml



and no more than 1763 ml with 90% confidence. An efficient baking quality screening strategy based on this predictive model for use in wheat breeding programmes is proffered and evaluated. AA

2136

He (H), Roach (RR) and Hosney (RC). **Effect of nonchaotropic salts on flour bread-making properties.** *Cereal Chemistry* 69(4): 1992; 366-371

Mixograph characteristics of wheat flour doughs were found to be affected by the addition of neutral salts. Changes in mixograph properties such as time to peak, peak height, or curve width were dependent on the specific ions present and their concn. In bake tests, certain salts from both the precipitating and the solubilizing portions of the lyotropic series increased loaf vol. relative to bread without salt. This was not true for all salts, possibly because of a negative action on gas production of yeast. The extent of the improvement and the optimum usage level varied for each salt. Nonchaotropic salts increased the dough strength of flours of varying quality. The order of increasing flour strength followed the order of the original strength of the flours at the same level of salt.  $\text{Na}_2\text{SO}_4$  had a more pronounced effect than did  $\text{NaCl}$ . Compared with  $\text{NaCl}$ ,  $\text{Na}_2\text{SO}_4$  greatly improved the rheological properties and the gas-retaining ability, as well as the loaf vol. and crumb grain, of the poor-quality flour (presumably by increasing hydrophobic interactions between gluten proteins). However, the same level of  $\text{Na}_2\text{SO}_4$  made the good-quality flour dough too elastic for breadmaking. The effect of non-chaotropic salt supported the hypotheses that the surface of the gluten proteins from the poor-quality flour was less hydrophobic than that from the good-quality flour, and that the hydrophobic interactions between proteins are important to bread quality. However, this study also demonstrated that the improvement in baking quality of poor-quality flour by salt was limited, which indicates that other factors besides hydrophobic interaction affect the baking properties of flours. AA

2137

Inoue (Y) and Bushuk (W). **Studies on frozen doughs. II. Flour quality requirements for bread production from frozen dough.** *Cereal Chemistry* 69(4): 1992; 423-428

Extensigraph properties and bread loaf vol. were determined for frozen doughs that had been stored for up to 10 wks or thawed and refrozen after an initial frozen storage period of one wk. Four flours were used: 3 differed in protein quality (strength) but contained approx. the same amount of protein, and two had the same protein quality but differed in

protein content. A modified extensigraph procedure developed for fermented doughs was used in this study. Yeast activity was assessed with the gassing power test. Extensigraph results (max. resistance and extension) showed that dough strength decreased markedly on freezing and thawing and gradually during frozen storage. Similarly, loaf vol. decreased markedly with freezing and thawing and gradually during frozen storage. Results of experiments in which yeast activity was maintained at the same level as that in nonfrozen doughs showed that the loss of dough strength on freezing, on thawing, and during frozen storage was the main reason for the decline in bread loaf vol. Accordingly, for best bread quality from frozen doughs, very strong flours should be used. Protein content, in the range covered in the present study, appears to be less important than protein quality. AA

## Cakes

2138

Chauhan (J) and O'Mahony (M). **Use of a signal detection ranking analysis to measure preference for commercial and health modified cakes.** *Journal of Sensory Studies* 8(1): 1993; 69-75

Consumer preference for a common 'yellow cake' prepared from a commercially available cake mix and for 3 'health modified' cakes was measured using signal detection ranking procedures. Consumers found the ranking protocol simple to use, making it a viable alternative to hedonic scaling. Measures of likelihood to choose to eat, after provision of nutritional information about the cakes, showed the same trend as measures of preference taken before. Yet, the dominance of preference for yellow cake over the 'health modified' cakes was reduced. AA

## Cookies

2139

Gaines (CS). **Collaborative studies on the baking quality of cookie flour by wire-cut type formulations (AACC methods 10-53 and 10-54).** *Cereal Foods World* 38(1): 1993; 26, 28-30

A micro- (40 g of flour) and a macro-method (225 g of flour) for the lab. production of commercially based wire-cut formula cookies were studied collaboratively. The new methods have less sucrose and more closely resemble commercial cookies (wire-cut) than do the existing lab. test baking cookie methods, which produce sugar snap cookies. Eight flours were duplicated and sent to 5 labs. Collaborative baking at each lab. revealed that the new methods differentiated well and easily ranked the 8 flours on the basis of cookie diam. and height.



The standardized procedures did not contribute to significant statistical variance within each lab. Neither duplication of flour nor day of baking significantly contributed to overall statistical variance. AA

## MILK AND DAIRY PRODUCTS

2140

Armbruster (BL) and Desai (N). **Identification of proteins and complex carbohydrates in some commercial low-fat dairy products by means of immunolocalization techniques.** *Food Structure* 11(4): 1992: 289-299

Immunolocalization technique to study structure-texture relationships in foods was adopted to identify  $\beta$ -lactoglobulin, casein, bovine whey proteins and egg albumin in low-fat frozen desserts, reduced fat process cheese, and salad dressings. Simplese 100 protein particles were characterized and compared to naturally occurring protein structures in low-fat foods. In low-fat salad dressing hydrocolloid was identified by complexing cellulase and hemicellulase with colloidal gold and applying the probe as a pre-embedding step on sections of embedded specimens or on material dried on grids. SD

2141

Aguilera (JM), Xiong (YL) and Kinsella (JE). **Viscoelastic properties of mixed dairy gels.** *Food Research International* 26(1): 1993: 11-17

Pure and mixed gels prepared from a whey protein isolate (WPI) and skim milk powder (SMP) by heating to 90°C at pH 4.3 - 4.6, with or without fat globules, were studied by mechanical testing. The testing involved compression to 20% deformation and oscillatory rheometry (storage and loss moduli,  $G'$  and  $G''$ , respectively). Compressive stresses of mixed gels varied between 0.7 and 1.9 kPa. Gels containing WPI reached higher  $G'$  values and had shorter gel-set times than those containing SMP. SMP based gels were more elastic than WPI based gels as revealed by the lower loss tangent ( $\tan \delta = G''/G'$ ) values achieved after 17 min (0.18 - 0.23 versus approx. 0.38, respectively). Addition of fat resulted in higher compressive stresses and shorter gel-set times but did not affect the initial gelation rate. Gels with different viscoelastic and mechanical properties were prepared with varying amounts of WPI, SMP and emulsified fat. AA

2142

Zbikowska (A), Dziuba (J), Ozimek (L) and Wolfe (FH). **Manufacturing processes influence the**

**proteolytic action of rennin on casein in several dairy products.** *Food Research International* 26(1): 1993: 19-26

Research was undertaken to estimate the extent of change in milk proteins brought about by industrial processes that are utilized in the manufacture of skim milk powder, evaporated milk, sodium caseinate and sodium coprecipitate. Potentiometric titration was used to determine the differences in the accessibility of functional groups. The kinetics of release of peptides soluble in 2% (w/v) TCA and glycopeptides soluble in 12% (w/v) TCA from casein substrates by rennin were determined. The casein substrates showed a diversified susceptibility to the action of rennin. The velocity of total peptides release at pH 5.6 decreased ( $P$  less than or equal to 0.05) in the following order: reconstituted condensed milk > sodium coprecipitate > sodium caseinate > reconstituted skim milk powder.  $K_m$  values for total peptide release were higher (lower affinity) ( $P$  less than or equal to 0.05) in sodium coprecipitate and sodium caseinate than in evaporated milk and skim milk powder. The velocity of glycopeptides release differed ( $P$  less than or equal to 0.05) for all substrates at pH 6.6.  $K_m$  values for the release of glycopeptides ranged from  $4.8 \times 10^{-5}$  to  $5.4 \times 10^{-5}$  M and were lowest ( $P$  less than or equal to 0.05) in skim milk powder at pH 6.6 and 5.6 and evaporated milk at pH 5.6. It was concluded that the susceptibility of the casein to proteolysis in milk products was influenced by processing. AA

## Milk

2143

Gupta (S) and Dharam Pal. **Application of reverse osmosis for concentration of buffalo milk.** *Journal of Food Science and Technology (India)* 30(5): 1993: 344-349

Buffalo milk was concentrated to 1.5X (25% TS) and 2.0X (33% TS) levels employing reverse osmosis process and the changes in its physico-chemical, microbial and sensory properties were examined. The av. permeate flux was 30.4 and 23.8 l/m<sup>2</sup>-h for 1.5X and 2.0X, respectively. The lipids, proteins, minerals and lactose in concentrated milk increased by the same level as the concn. factor, thereby indicating their 100% rejection by the thin film composite reverse osmosis membrane. There were no milk solids in the permeate at any stage of operation. The reverse osmosis process did not exert any adverse effect on the titratable acidity, pH, free fatty acids, free fat and microbial load. The sensory quality of reverse osmosis processed milk was not different from that of fresh buffalo milk. The most notable effect of reverse osmosis process was noticed on the size of fat globules, which reduced to less than 2.5  $\mu$  upon 2.0X concn. Consequently, the



skimming efficiency of reverse osmosis milk was extremely poor. AA

2144

Saini (SPS) and Bains (GS). **Flavour of iron fortified buffalo milk.** *Research and Industry, India* 38(3): 1993: 146-149

Standardized (5% fat buffalo milk) was fortified with  $\text{Fe}^{++}$  or  $\text{Fe}^{+++}$  at 10 p.p.m. level and there was no adverse effect on its flavour and storability. Addition of ascorbic acid/ascorbyl palmitate did not improve flavour at elevated level of fortification. Fortification with 10 p.p.m. of elemental Fe improved the nutritional status of milk. GS

2145

Tziboula (A) and Muir (DD). **Effect of starches on the heat stability of milk.** *International Journal of Food Science and Technology* 28(1): 1993: 13-24

Factors associated with the properties of the starch molecules that influence the heat stability of milk and the effect of starch additive on the stability of the milk proteins on heating are discussed. Starches from various biological sources were added (0.5 - 1.5% w/w) to skim milk and pregelatinized by heating at 70°C for 30 min. The heat coagulation time (HCT) of the milk-starch mixtures was evaluated at 140°C. Increasing the concn. of added starch caused a decrease in HCT. The amylose/amylopectin composition or the granular structure of the starches was not related to the reduction in the heat stability of milk. The heat stability of mixtures increased when the molecular structure of the starches was modified by acid hydrolysis or cross-linking. GS

2146

Lawrence (LM), Gilmour (A) and Pearce (J). **The influence of calcium on the chromogenic limulus amoebocyte lysate assay of lipopolysaccharide endotoxins in liquid milk.** *International Journal of Food Science and Technology* 28(1): 1993: 103-109

Ca ions were shown to have a profound effect on the chromogenic *Limulus* Amoebocyte Lysate assay of lipopolysaccharides in liquid milk. There appeared to be two optima within the range of 0-1.0 mM added  $\text{CaCl}_2$ , with an inhibition of the assay at Ca ion concn. between 0.2 and 0.4 mM, and above 0.6 mM. With products of this nature, standardization of Ca ion content is required for meaningful comparisons of results between samples. Further investigation is required to assess the possible influence of other serum constituents. AA

2147

Adhikari (AK) and Singhal (OP). **Effect of heat resistant micro-organisms on the fatty acid profile and the organoleptic quality of UHT milk during storage.** *Indian Journal of Dairy Science* 45(5): 1992: 272-277

The initial volatile fatty acid content of UHT milk of 2.2 units increased to 6.2 and 5.1 units after 33 days of storage at 37 and 22°C respectively. The free fatty acids increased from 2.2  $\mu$  moles/ml of milk to 7.9 and 8.9  $\mu$  moles/ml during storage. Titratable acidity increased to 0.177 and 0.192 at both temp. from initial value of 0.135. The psychrotropic spore counts increased significantly within 16 days of storage at both temp. (0.77 to 2.61 and 2.46). The changes in the flavour score was significant at 1% level of significance ( $P < 0.01$ ) between the periods and at 5% level ( $P < 0.05$ ) of significance between the series, which revealed a fast deterioration of UHT milk due to the production of rancid flavour. SRA

2148

Champagne (CP). **Effect of penicillin on free or immobilized lactococci: Milk acidification and residual antibiotic level.** *Journal of Food Safety* 12(4): 1992: 327-339

Five lactic acid culture were added to milk containing penicillin, and the effect of immobilization on acidification and residual penicillin concn. were determined. Cells of *Lactococcus lactis* subsp. cremoris CRA-1 immobilized in calcium alginate beads were less sensitive to penicillin than free cells, and inhibition occurred later in the fermentation. The lactococci were less sensitive to penicillin when high cell densities were inoculated ( $10^9$  CFU/mL). There was a significant reduction of penicillin (up to 0.3 IU/mL) when milk was inoculated with high populations of *Lac. cremoris* and incubated at 30°C for 6 h. The drop in penicillin concn. was not related to adsorption to the alginate or to the presence of  $\beta$ -lactamase on the cultures. When free cells of *Lac. cremoris*, *Streptococcus salivarius* subsp. thermophilus or *Lactobacillus delbrueckii* subsp. bulgaricus were added to milk containing antibiotics, and incubated at 4 or 10°C for 48 h, significant reduction of penicillin levels did not occur in the contaminated milk. Milks containing more than  $4 \times 10^6$  lactococci CFU/mL can give false positive results in the antibiotic disk assay using *Bacillus subtilis*. AA

## Milk products

2149

Latha Sabikhi, Kanawjia (SK) and Singh (S). **Recent advances in the application of starter cultures in fermented milk products.** *Beverage and Food World* 19(5): 1992: 37-39



Aspects covered are: direct vat starters, frozen concentrated starters, freeze dried starter concentrates, super concentrates of starter, and other innovations (genetic engineering and dairy starters, plasmid biology, gene transfer systems, potential applications of genetic engineering in dairy starter cultures). BV

## Cheese

2150

de la Fuente (MA), Fontecha (J) and Jaurez (M). **Fatty acid composition of the triglyceride and free fatty acid fractions in different cows-, ewes- and goats-milk cheeses.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 196(2): 1993: 155-158

The fatty acid composition of the triglyceride fraction and the individual and total free fatty acids in different cows-, ewes- and goats-milk cheeses were analysed. The highest total free fatty acid levels were recorded in blue cheeses (Roquefort: 26.0 g/kg; Cabrales: 57.3 g/kg) and in the aged Manchego cheese (32.4 g/kg), followed by those in hard cheeses manufactured using unpurified rennet pastes containing pregastric esterases (Parmesan: 13.7 g/kg; Majorero: 20.8 g/kg). These samples had sharp flavours. The soft cheeses with surface flora presented moderate levels of free fatty acids (Camembert: 5.1 g/kg; de la Vera: 9.9 g/kg). The remaining cheeses considered (Mahon: 8.7 g/kg; Roncal: 8.2 g/kg; Tetilla: 5.8 g/kg; Idiazabal: 5.6 g/kg) also exhibited moderate levels of lipolysis. A comparison of the fatty acid profiles for the two fractions studied yielded higher contents for the short-chain fatty acids in the free fatty acid fraction, except in the blue and goats-milk cheeses. AA

## Feta cheese

2151

Litopoulou-Tzanetaki (E), Tzanetakis (N) and Vafopoulou-Mastrogiannaki (A). **Effect of the type of lactic starter in microbiological chemical and sensory characteristics of feta cheese.** *Food Microbiology* 10(1): 1993: 31-41

The influence of the type of lactic starter inoculation on chemical and microbiological characteristics of Feta cheese was investigated. Yoghurt (Y) and starters, (A) *Lactococcus lactis* subsp. *lactis* + *Lactobacillus casei* + *Leuconostoc cremoris* (6:2:2), (B) *L. lactis* subsp. *lactis* + *L. casei* + *Enterococcus durans* (6:2:2), (C) *L. lactis* subsp. *lactis* + *L. casei* + *E. durans* + *Leuc. cremoris* (6:2:1:1), were examined. Inoculation with starters B and/or C had a significant ( $P < 0.05$ ) effect on growth of lactococci in fresh cheese. Lower ( $P < 0.05$ ) pH values in starter

B (range 4.39 - 4.79) and/or starter C (range 4.45 - 4.74) cheese were recorded until 120 days. Higher acid production or lower pH retarded cheese proteolysis by lactococci early in ripening. However, the increasing with ripening population of *E. durans* in cheese made with starter B or C which produces proteolytic enzymes active at low pH, accumulated higher ( $P < 0.05$ ) amounts of soluble N fractions as ripening progressed in these types of cheese. Levels of PTA-N after 75 days were 3.21, 3.49, 4.08 and 4.89% of the total N in cheese made with starter Y, A, B and C respectively, and contributed to better ( $P < 0.05$ ) flavour, body and texture scores. Thus, mesophilic starters supplemented with *E. durans* might be considered appropriate for Feta cheese production. AA

## Mozzarella cheese

2152

Jana (AH) and Upadhyay (KG). **Process standardization for manufacture of mozzarella cheese from homogenized buffalo milk.** *Indian Journal of Dairy Science* 45(5): 1992: 256-260

The modifications required for obtaining mozzarella cheese made from buffalo milk homogenized at 25 to 50 Kg/cm<sup>2</sup> pressure and 60°C temp. were: (a) addition of CaCl<sub>2</sub> to cheese milk (at 0.01% w/w), (b) higher cooking temp. (42.5°C), (c) higher draining acidities of whey (0.43 - 0.45% LA) and (d) lower temp. of moulding water and its shorter contact period with the curd (85-90°C/1-3 min) for plasticizing the curd. SRA

2153

Ravi Sundar (M) and Upadhyay (KG). **Influence of whey acidity at draining on the manufacture of buffalo milk mozzarella cheese - Baking, rheological and sensory characteristics.** *Indian Journal of Dairy Science* 45(5): 1992: 261-267

The melting and fat leakage properties of cheese showed a significant decline with increase in whey acidity (WA) at draining. The experimental cheeses were ranked in the order of 0.40 > 0.35 > 0.45 > 0.30 > 0.50% LA for their suitability as a topping on pizza. The WA was found to significantly influence the rheological properties of cheeses. The cheese made using lowest WA at draining had least values for hardness, cohesiveness, chewiness and gumminess. Cheese made by draining at 40% acidity showed max. springiness. Stretchability of curd was impaired at extremes of WA used. Organoleptically 0.40% WA cheese had a superior flavour, body-texture and total score. SRA



2154

Reddy (CR) and Rajorhia (GS). **Present status of peda and burfi technology - A review.** *Indian Journal of Dairy Science* 45(5); 1992; 220-225

This review highlights the need for standardising appropriate technology for large scale manufacture of *peda* and *burfi*. Aspects covered include: technology, chemical composition, microbiological quality, method of preparation, packaging and shelf-life of *peda* and *burfi*. 20 references. SRA

## Yoghurts

2155

Vedamuthu (ER). **The yoghurt story - past, present and future. Part IX.** *Dairy, Food and Environmental Sanitation* 12(4); 1992; 220-221

Article briefly covers aspects like yoghurt and health, nutritional benefits of yoghurt, yoghurt and intestinal health and other reported health benefits. SRA

## Milk proteins

2156

Kalichevsky (MT), Blanshard (JMV) and Tokarczuk (PF). **Effect of water content and sugars on the glass transition of casein and sodium caseinate.** *International Journal of Food Science and Technology* 28(2); 1993; 139-151

The glass transitions of casein and sodium caseinate were studied as a function of water content, using differential scanning calorimetry (DSC), dynamic mechanical thermal analysis (DMTA), a mechanical 3 point bend test, solid state  $^{13}\text{C}$  nuclear magnetic resonance (NMR) spectroscopy and X-ray diffraction. Glucose and lactose at 10% mass ratio of anhydrous casein had no effect on the glass transition of casein as a function of water content, although at 50% mass ratio there was some increase in glass transition temp. ( $T_g$ ), i.e. an anti-plasticizing effect, with glucose. In contrast, with 50% fructose in sodium caseinate, there was some plasticizing effect. These results are compared with previous results for amylopectin and gluten-sugar mixtures. AA

2157

Bumberger (E) and Beltz (H-D). **Bitter taste of enzymic hydrolysis of casein. I. Isolation, structural and sensorial analysis of peptides from tryptic hydrolysates of  $\beta$ -casein.** *Zeitschrift Fuer*

$\beta$ -Casein A<sup>2</sup> was isolated from milk of homozygous cow and hydrolysed with trypsin. The hydrolysate was separated by RP-HPLC into 18 peptides, all but one of which could be attributed to the sequence of  $\beta$ -casein on the basis of the amino acid composition. Some peptides overlapped. In total, they represented about 97% of the protein sequence. Only 3 peptides had a bitter taste, namely I<sup>49</sup>-N<sup>68</sup> (recognition threshold 1.0 mg/ml, 0.45 mmol/l), I<sup>49</sup>-K<sup>97</sup> (1.5 mg/ml, 0.23 mmol/l) and G<sup>203</sup>-V<sup>209</sup> (0.175 mg/ml, 0.23 mmol/l). The contribution of the 3 peptides to the overall bitterness of the  $\beta$ -casein hydrolysate (2.67 mg/ml) was about 11, 21 and 60%, respectively. Peptide I<sup>49</sup>-K<sup>97</sup> was present in the hydrolysate together with its fragments I<sup>49</sup>-N<sup>68</sup> and S<sup>69</sup>-K<sup>97</sup>. Remarkably, the smaller and more hydrophobic fragment I<sup>49</sup>-N<sup>68</sup> was less bitter than I<sup>49</sup>-K<sup>97</sup> on a molar basis, whereas the larger and more hydrophilic fragment S<sup>69</sup>-K<sup>97</sup> had a neutral taste. These results show that in the case of larger peptides neither hydrophobicity nor size are responsible alone for bitter potency, but that conformational parameters must be of great importance. Furthermore, it can be concluded that only a part of the structure is responsible for the contact with the receptor. The bitterness of G<sup>203</sup>-V<sup>209</sup> is discussed in connection with related synthetic peptides in the literature. AA

## MEAT AND POULTRY

### Meat

2158

Stapelfeldt (H), Bjorn (H), Skibsted (LH) and Bertelsen (G). **Effect of packaging and storage conditions on development of warmed-over flavour in sliced, cooked meat.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 196(2); 1993; 131-136

The development of warmed-over flavour (WOF) in a pilot-scale experiment was followed by sensory evaluation and 3 objective methods (thiobarbituric acid reactive substances, relative hexanal content and fluorescent lipid oxidation products) during 14 days of chill storage at 4°C of sliced, cooked lean beef using 3 different packaging conditions: (1) in air in a polyethylene foil (PE); (2) in 99% vacuum in a laminate foil with low oxygen transmission rate (VAC); (3) in a modified atm. (30% CO<sub>2</sub>/70% N<sub>2</sub>) in a laminate foil with low oxygen transmission rate (MAP). Each of the objective methods correlated well with the sensory evaluation. The sensory quality of the meat packed in PE was clearly inferior to the VAC



and MAP packed meat, having less meat taste and a perceptible degree of WOF when reheated after only 1 day of storage, increasing to an unacceptable level within 3 days of storage. In contrast, the sensory quality of the VAC and MAP packed meat remained high throughout the storage period. Irrespective of packaging method, no effect of light during the chill storage period on the development of WOF was detected. MAP packaging for precooked beef was tested on a larger scale in a senior citizen food service system. The results showed that in a practical application of MAP the major problem in avoiding WOF was the achievement of a sufficiently low residual oxygen content in the packages. AA

2159

Sahoo (J) and Berwal (J). **Edible or potentially edible offals from meat animals.** *Beverage and Food World* 19(5): 1992: 19-20

## Beef

2160

Penney (N), Hagyard (CJ) and Bell (RG). **Extension of shelf-life of chilled sliced roast beef by carbon dioxide packaging.** *International Journal of Food Science and Technology* 28(2): 1993: 181-191

Commercially prepared sliced roast beef in conventional vacuum and oxygen-free saturated carbon dioxide controlled atm. packs was stored at +10°C, +3°C and -1.5°C. The development of foreign flavours during chilled storage resulted in product rejection before the development of putrid flavours characteristic of overt microbial spoilage. The nature of these foreign flavour elements reflected the qualitative composition of the microflora developing on the roast beef slices with 'sharply acidic' associated with *Lactobacillus*-dominated flora and 'sweaty' occurring when these flora contained significant numbers of *Brochothrix thermosphacta*. Product in vacuum packs was rejected on sensory criteria by a trained panel after 3 days, 3 wks and 8 wks for storage at +10°C, +3°C and -1.5°C, respectively. At these temp., in oxygen-free saturated carbon dioxide controlled atm. packaging, rejection levels were not attained after 4 days, 10 wks and 16 wks respectively. AA

2161

Mielche (MM) and Bertelsen (G). **Effects of heat treatment on warmed-over flavour in ground beef during aerobic chill storage.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 197(1): 1993: 8-13

The effect of heat-treatment conditions (end-point temp. and rate) on warmed-over flavour (WOF) development in ground beef during aerobic chill

storage was examined. Quantification of WOF was determined by extraction of thiobarbituric-acid-reactive substances (TBARS), which were correlated with scores obtained by a sensory panel. The effect of end-point temp., heating rate and chill-storage time on TBARS is described by a mathematical model based on first-order kinetics. The model predicts increasing levels of TBARS with increasing end-point temp. (60 - 80°C), increasing heating time and chill-storage time. The model can be used for optimizing processing conditions of heat-treated meat products. AA

## Pork

2162

Yen (LC), Sofos (JN) and Schmidt (GR). **Destruction of *Listeria monocytogenes* by heat in ground pork formulated with Kappa-carrageenan, sodium lactate and the algin/calcium meat binder.** *Food Microbiology* 9(3): 1992: 223-230

Results indicate that the heating and cooling rates of ground pork (GP) with various additives were very similar: Kappa-carrageenan (1%) and sodium lactate (3% of a 60% sol.) did not affect ( $P > 0.05$ ) thermal destruction in uncured GP, but Kappa-carrageenan reduced ( $P < 0.05$ ) the protective effect of the cure; and the algin/Ca binder did not affect ( $P > 0.05$ ) the extent of destruction of *L. monocytogenes* by heat in GP. Cooking GP to 62°C over a period of 25 min of heating (from 45°C) time destroyed 5.80-7.35 log cfu g<sup>-1</sup> of *L. monocytogenes*/g, depending on the formulation. SRA

## Products

### Ham

2163

Stecchini (ML), Aquili (V), Sarais (I) and Pitotti (A). **Inhibition of *Listeria monocytogenes* by *Lactococcus lactis* subsp. *lactis* isolated from Italian raw ham.** *Journal of Food Safety* 12(4): 1992: 295-302

A total of 168 lactic acid bacteria strains isolated from Italian raw hams were screened for antagonistic activity against *Listeria monocytogenes* by using an agar spot test. Sixteen strains were found to produce inhibition zones on buffered All Purpose Tween (APT) agar at pH 6.5 whereas only one strain was inhibitory to Trypticase soy agar medium which was identified as *Lactococcus lactis* subsp. *lactis* B10. *L. lactis* strains have been demonstrated to produce bacteriocin-like



substances that inhibit the growth of *L. monocytogenes*. The results indicate that the antibacterial compound produced by *L. lactis* B10 is a heat stable protein with a bactericidal mode of action. CSA

## Sausages

2164

Hazarika (M) and Biro (G). **Effect of incorporation of blood proteins into sausage.** *Journal of Food Science and Technology (India)* 30(5): 1993; 380-381

Effect of utilization of pig blood proteins, such as plasma, whole blood, plasma protein isolate and globin protein isolate, either individually or in combinations, as ingredients and replacements of sausage mixture in Lesco sausage formulation was evaluated. Shrinkage was marginal during 8 days of storage at 4 plus or minus 1°C. protein content was higher than the control and *Escherichia coli*, *Salmonella* and *staphylococcus aureus* were absent in all the samples. Organoleptic qualities were similar to the control, except for the least score for appearance in case of sample with 2% blood. It is evident that incorporation of blood proteins in sausage formulations upto certain levels yields acceptable product from the view point of chemical, microbial and sensory qualities. AA

2165

Roudot (A-C), Duprat (F), Grotte (MG) and O'Lidha (G). **Objective measurement of the visual aspect of dry sausage slices by image analysis.** *Food Structure* 11(4): 1992; 351-359

Images of 20 dry sausage slices and different factors corresponding to aspect structure were analysed. Principal component analysis of data indicated difference between the types of sausages. Good correlation was found with meat part of the slices and visual aspect. SD

## Poultry

2166

Sahoo (J) and Tiwari (CM). **Scope for utilization of poultry processing plant waste - a review.** *Poultry Gulde* 30(10): 1993; 27-33

Utilization of poultry processing waste such as blood, feather, head, feet, viscera and scald water, washed water and chiller water were studied for prevention of environmental pollution, disease control and protein recovery. Blood components such as haemoglobin, albumin, fibrin, serum, plasma were exploited for commercial use. Poultry offal meal was used to fight against the rising cost

of fish meal. Improved techniques in processing, preservation and recycling of poultry byproducts recommended. GS

## Chickens

2167

Ammon (J), Mildau (G), Ruge (W) and Delincee (H). **A gas chromatography procedure to detect the radiation processing of chicken meat.** *Deutsche Lebensmittel-Rundschau* 88(2): 1992; 35-37 (De)

A simple GC procedure to detect the radiation processing of chicken is presented. The method is based on the preferential formation of  $C_{n-1}$  and  $C_{n-2}$  alkanes and alkenes (n being the carbon number of the parent fatty acid), originating from cleavage of the lipids near the ester bond by the radiation treatment. Sample preparation was performed according to common pesticide analysis by fat extraction and separation of the hydrocarbons using florisil chromatography. Separated hydrocarbons are analysed by GC using a flame ionisation detector, and positive results are confirmed by GC - MS. AA

## Qualls

2168

Renukumari and Mushtari Begum (J). **Studies on Tandoori and battered quail.** *Journal of Food Science and Technology (India)* 30(5): 1993; 374-376

The proximate composition, microbial load and acceptability of quail meat from 6, 12 and 18 wk old birds as well as the processed products were determined. Tandoori and battered quails were found to be highly acceptable, and no statistically significant (P less than or equal to 0.05) differences were observed with respect to the age of bird and proximate composition. However, slight decrease in moisture with advancement of age from 6 to 18 wks against higher proteins, fat, energy and methionine contents were observed. Age of the bird and method of cooking were directly related to bacterial load. AA

## Turkeys

2169

Barbut (S). **Colour measurements for evaluating the pale soft exudative (PSE) occurrence in turkey meat.** *Food Research International* 26(1): 1993; 39-43

The CIELAB colour measuring system was used to measure the colour of turkey breast muscle from young toms, ranging from very light to very dark in colour. Lighter samples exhibited lower pH, lower

gel strength, and higher cooking loss compared to darker samples. The 'L' value (lightness) was significantly correlated with pH of the intact ( $r = -0.71$ ,  $P$  less than or equal to 0.01) and chopped muscle ( $r = -0.66$ ), cooked gel strength ( $r = -0.84$ ) and cooking loss ( $r = 0.87$ ). The results indicate that a type of pale soft and exudative (PSE) condition may exist in turkey breast meat from young toms and that such meat can be identified by a fast and non-destructive colour evaluation. AA

## Products

### Eggs

#### Egg powder

2170

Narvaiz (P), Lescano (G) and Kairiyama (E). **Physicochemical and sensory analyses on egg powder irradiated to inactivate *Salmonella* and reduce microbial load.** *Journal of Food Safety* 12(4): 1992; 263-382

Egg powder was treated with 0, 2, 5 and 10 kGy of gamma radiation at 20°C to inactivate *Salmonella* and to stabilize its microbial load. Microbial, physicochemical and sensory detn. were performed during 4 months of storage to select the optimal radiation dose to attain the objective without significantly reducing egg quality. Microbial results show that 2.0 kGy inactivated *Salmonella* and reduced microbial load to levels below those stipulated by the Argentine regulations. Physicochemical detn. of egg powder extracts for peroxide number, spectrophotometric measurements in the visible and UV regions, functional properties on sponge cakes made with egg powder (height, compression-relaxation cycle parameters), foam stability and viscosity showed that gamma-radiation at the dose of 2 kGy, did not cause significant changes in these parameters. Higher radiation doses (5 and 10 kGy) did increase rancidity, pigment loss and protein chain scission. Sensory detn. performed on egg powder, and on cakes manufactured with it, agreed with the physicochemical results. After 110 storage days, 2 kGy was the most suitable of the tested doses. AA

## SEAFOODS

2171

Singh (BR) and Kulshrestha (SB). **Isolation of ampicillin sensitive *Aeromonas* from aquatic foods using xylose-lysine-desoxycholate agar and ampicillin-dextrin agar.** *Journal of Food Science and Technology (India)* 30(5): 1993; 359-361

In the present study, 96 fresh water fishes, 37 marine fishes, 13 fresh water prawns, 13 marine shrimps and 26 molluscs have been screened for *Aeromonas* sp. by plating on xylose-lysine-desoxycholate agar (XLDA) and ampicillin-dextrin agar (ADA), after enrichment in alkaline broth. A total of 13 *Aeromonas* strains were isolated with the use of XLDA; 8 from fresh water fishes, 4 from molluscs and one from marine shrimp. Among *Aeromonas* isolates, 11 were *A. sobria*, one each was *A. salmonicida* subsp. *salmonicida* and *A. salmonicida* subsp. *Masovici*. With the use of ADA, only 7 samples were positive for *Aeromonas*, while the undetected isolates were the ampicillin-sensitive strains. Among the isolates, 5 were sensitive to all the 10 antibiotics tested, while the sensitivity to other antibiotics varied widely. None of the isolates were resistant to nalidixic acid, oxytetracycline, chloramphenicol, norflox and doxycycline. AA

### Fish

2172

Karl (H). **Determination of nitrite in smoked fish and other fish products.** *Deutsche Lebensmittel-Rundschau* 88(2): 1992; 41-45 (De)

Changes of the nitrite content in cured and smoked herring and trout fillets during storage at +7°C were studied. The fillets were treated for 15 min with a nitrite containing brine of different concn. Following salt concn. of the brines were chosen: 5, 6, 10, 12 and 20% respectively. No changes in the sodium nitrite content of homogenized samples were found during frozen storage at -30°C, whereas deep frozen fillets showed changes in the nitrite content. During the storage of nitrite containing samples at +7°C in a refrigerator the nitrite content decreased with prolonged storage time. The reduction rate depended on the salt concn. of the brine, the pretreatment of the sample and on the freshness of the fish. The smoking process reduced the original nitrite content to one half. After 8 days at +4°C smoked fresh trout fillets contained only 14% to 31% of the original nitrite content, depending on the concn. of the brine. AA

### Cod

2173

Wang (C) and Shelef (LA). **Behaviour of *Listeria monocytogenes* and the spoilage microflora in fresh cod fish treated with lysozyme and EDTA.** *Food Microbiology* 9(3): 1992; 207-213

Raw cod fish fillets were treated before storage by dipping for 10 min at 20°C in: (a) deionized water;



(b) lysozyme (3 mg ml<sup>-1</sup> H<sub>2</sub>O); (c) Na<sub>2</sub>EDTA (5-25 mM); and (d) 3 mg ml<sup>-1</sup> lysozyme and 25 mM EDTA combination. After removal of excess moisture, half of the samples were surface inoculated with *Listeria monocytogenes* strain Scott A (c. 10<sup>3</sup> cells g<sup>-1</sup>), and the other half was allowed to undergo spoilage by the natural microflora. The fish was stored at 20°C for 3 days or at 5°C for 17 days. *L. monocytogenes* was able to multiply in the fish at both storage temp. However, the fish shelf-life at 5°C was shorter than the lag phase of *Listeria*. Lysozyme suppressed listerial growth but had no inhibitory effect against the natural microflora. In contrast, treatment with EDTA (15 or 25 mM) was also effective in suppressing growth of the natural microflora and preventing slime formation. AA

## Hoki

2174

Ryder (JM), Fletcher (GC), Stec (MG) and Seelye (RJ). **Sensory, microbiological and chemical changes in hoki stored in ice.** *International Journal of Food Science and Technology* 28(2); 1993; 169-180

Sensory, physical, microbiological and chemical analyses were carried out on whole hoki during 21 days of storage in ice. Sensory results show that cooked hoki developed unpleasant odours and flavours after 11 days. Texture changes in cooked fish were minimal. Assessment of the raw fish provided a useful means of predicting quality of cooked fish. The total viable aerobic count on the fish surface first exceeded ICMSF standards after fish had been stored for 11 days in ice. Hypoxanthine and K value were good objective indicators of the freshness of hoki, while measurement of trimethylamine provided a means to monitor the onset of spoilage. AA

## Salmon

2175

Hudson (JA) and Mott (SJ). **Growth of *Listeria monocytogenes*, *Aeromonas hydrophila* and *Yersinia enterocolitica* on cold-smoked salmon under refrigeration and mild temperature abuse.** *Food Microbiology* 10(1); 1993; 61-68

Strains of the cold-tolerant bacteria *Listeria monocytogenes*, *Aeromonas hydrophila* and *Yersinia enterocolitica* were inoculated onto samples of cold-smoked salmon and incubated at 5 and 10°C under both aerobic and vacuum-packaged conditions. Enumeration of these organisms was carried out over a time course and data were analysed to give values for the generation and lag times. *L. monocytogenes* grew under all of the conditions tested while *A. hydrophila* grew only at

10°C. *Y. enterocolitica* grew under all conditions tested except aerobic incubation at 5°C. The derived lag and generation times approximated those predicted by response surface models available as published programs or produced in this lab. Contrary to some literature data, it was concluded that *L. monocytogenes* is able to grow significantly on refrigerated vacuum-packaged cold-smoked salmon within the shelf-life of the product. AA

## Trout

2176

Nilsson (K) and Ekstrand (B). **The effect of storage on ice and various freezing treatments on enzyme leakage in muscle tissue of rainbow trout (*Oncorhynchus mykiss*).** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 107(1); 1993; 3-7

In order to study the biochemical changes in fish muscle during ice storage and freezing-thawing processes, the activities of certain marker enzymes in the cell interstitial fluid from muscle tissue of rainbow trout were measured. The enzymes analysed were: lysosomal  $\alpha$ -glucosidase (E.C.3.2.1.20),  $\beta$ -N-glucosaminidase (E.C.3.2.1.30) and acid phosphatase (E.C.3.1.3.2). The activity in centrifuged tissue fluid (CTF) was compared with the activity in total homogenate. When ice storage was varied between 3 and 14 days, it did not affect enzyme leakage into the CTF significantly. However, there was a distinct difference between fresh fish and fish iced even for only 1 day, which gave increased leakage of marker enzymes. When the ice-stored samples were subject to a freezing-thawing cycle they showed a marked increase in enzyme activity in the press juice. When the freezing process was varied so as to achieve different freezing rates, the slowest freezing rate caused the highest enzyme leakage. AA

## PROTEIN FOODS

2177

Vaidehi (MP) and Varalakshmi Rao. **Protein quality of extrusion cooked foods of blended wheat, sorghum, horsegram and sunflower seed cake.** *Beverage and Food World* 19(5); 1992; 22, 24

Extrusion cooked foods based on (A) blend of sorghum (60%), horsegram (30%) and sunflower seed cake (10%) and (B) blend of wheat (60%), horsegram (30%) and sunflower seed cake (10%) were prepared by the extrusion cooking process. The Protein efficiency ratios of the two foods were 1.9 and 2.1, respectively as compared with 2.8 obtained for skim milk powder. The extruded foods



when served with coated spices or sugar were acceptable to general consumers and school children. AA

#### Infant foods

2178

Livingstone (AS), Feng (JJ) and Malleshi (NG). **Development and nutritional quality evaluation of weaning foods based on malted, popped and roller dried wheat and chickpea.** *International Journal of Food Science and Technology* 28(1): 1993: 35-43

Optimal conditions for malting wheat and chickpea for preparation of weaning foods were standardized and malted flours from 48 h germinated wheat and 24 h germinated chickpea were blended to prepare malted weaning food. Wheat was dry-heat-parboiled (bulgurized), popped in hot sand and blended with popped chickpea flour to prepare popped weaning food. Mildly toasted and debranned wheat and dehusked chickpea flours were mixed and the blend was roller-dried for preparation of roller dried weaning food. The formulations had 60% wheat, 30% chickpea, 5% skim milk powder and 5% sucrose and contained about 16% proteins. The cooked paste viscosity (dietary bulk) of malted food, popped food with malt, and roller dried food with malt was significantly lower than popped and roller dried foods at all comparable slurry concn. The energy density of malted and malt-added food slurries at spoon feeding consistency was  $4.2 \text{ KJ}^{-1}$ . PER (2.91), biological value (88.3) and true digestibility (87.5) values of malted food were higher than that of the other formulations. AA

2179

Singh (MN) and Mathur (BN). **Reconstitution behaviour of spray-dried infant formula as affected by the type of milk proteins employed for encapsulation of fat.** *Indian Journal of Dairy Science* 45(5): 1992: 251-255

An investigation was carried out to evaluate the influence of varying levels of whey protein and caseins for encapsulation of fat globules on the reconstitution behaviour of spray-dried infant formula. The formula consisted of 20% fat (blend consisting of milk fat, palm oil, groundnut oil and coconut oil), and 12% proteins (with ranging levels of whey proteins:casein ratios). With 100:0: 60:40 and 20:80 levels of whey proteins to caseins, the solubility index was observed to be 0.53: 0.70 and 0.93 respectively. The corresponding values for wettability were 43.32, 57.47 and 68.05 (sec); sinkability (at 6 sec) 12.33, 19.35 and 27.41% transmission; dispersibility 92.77, 89.32 and

86.75%; and flowability 0.80, 0.72 and 0.66 (cot 0), respectively. Thus a distinctive improvement in the reconstitution properties was observed when the proportion of whey protein was higher in comparison with the caseins. This improvement in the reconstitution behaviour may be attributed to the greater hydrophobicity of whey proteins in comparison with caseins when present in the membrane of fat globules consequent to homogenization. AA

#### Weaning foods

2180

Kotwaliwale (N), Sharma (GP) and Jain (SK). **Storage stability of commercially available weaning foods.** *Journal of Food Science and Technology (India)* 30(5): 1993: 331-334

Analysis of equilibrium moisture content (MC) and  $a_w$  at 20, 30, 40 and 50°C for 2 commercial weaning foods showed a range of  $a_w$  at all temp., at which major moisture related changes take place. At 50°C the storage stability of these foods is max. at  $a_w$  of 0.275 - 0.315 and 0.285 - 0.350 corresponding to equilibrium MC of 0.026 - 0.028 g water/g dry solid and 0.047 - 0.055 g water/g solid. With increase in MC, the moisture binding energy decreases and moisture becomes more free. Isothermic heat decreases with an increase in MC at all 4 temp. SD

#### ALCOHOLIC AND NON-ALCOHOLIC BEVERAGES

##### Alcoholic beverages

2181

Seiffert (B), Swaczyna (H) and Schaefer (I). **Simultaneous determination of L-ascorbic acid and D-isoascorbic acid in alcoholic beverages by HPLC.** *Deutsche Lebensmittel-Rundschau* 88(2): 1992: 38-40 (De)

A HPLC-method for the simultaneous separation of L-ascorbic acid and D-isoascorbic acid (erythorbic acid) in alcoholic beverages is described. The clean up procedure is simple and free of loss. Based on a safe and sensitive detn. this method is well suited for routine analysis. The practicableness of the reported method has been manifested by analysing different imported beer and Australian wines. The limit of detn. is about 3 mg/l. AA



2182

Clyne (J), Conner (JM), Paterson (A) and Piggott (JR). **The effect of cask charring on Scotch whisky maturation.** *International Journal of Food Science and Technology* 28(1): 1993; 69-81

The developing chemical composition and aroma attributes of whisky distillates maturing in uncharred and charred American oak casks were compared at intervals over a total maturation period of 3 yrs. Chemical variables were selected to encompass a wide range considered to contribute to the flavour of maturing distillate. Descriptive sensory analysis was used to generate detailed sensory profiles which were very different for the charred and uncharred cask samples throughout the maturation period. The charred cask samples were rated significantly higher for terms characteristic of mature distillates and significantly lower for terms characteristic of immature distillates. There were significant differences in syringaldehyde, coniferaldehyde, sinapaldehyde, vanillic acid, total phenols and absorbance between the charred and uncharred cask samples but these differences did not completely account for the changes in sensory characteristics. AA

## Wines

2183

Enkelmann (R). **Release of trace elements from wine processing aids. Part 5. Perlite.** *Deutsche Lebensmittel-Rundschau* 88(7): 1992; 217-221 (De)

Twelve commercial perlites were investigated on the release of Cu, Zn, Fe, Mg, Cr, Ni, Pb, Cd, As, Al and Snn to both boiling 20% nitric acid and 1% tartaric acid sol. The expected increases in the wine caused by a perlite wash filtration with a dosage of 60 g/hl were calculated. Two perlites releases higher traces of Mn (27 and 53 mg/kg) to tartaric acid sol. All products investigated released increased traces of Fe (74-191 mg/kg; average: 105 mg/g) and especially of Al (197 - 432 mg/kg; average: 298 mg/kg) to the organic acid sol. The increases in the wine caused by these 3 trace elements are in the same magnitude as the limits allowed in the German drinking water conservation legislation. These increases can be considered negligible. The increases in concn. caused by the remaining 8 elements are extremely small and therefore negligible. AA

2184

Suarez (JA) and Agudelo (J). **Characterization of yeast and lactic acid bacterial species in ropy**

**wines.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 196(2): 1993; 152-154

The microflora in ropy sherry-type wines were identified. The genus *Saccharomyces* were the predominant yeasts (81%), with *S. beticus* prevailing. *Lactobacillus plantarum* was the most frequent bacterial species (33.9%), followed by *Streptococcus diacetilactis* (22%) and *S. lactis* (16.9%). AA

2185

Adsule (RN), Chougule (BA), Kotecha (PM) and Kadam (SS). **Processing of ber. II. Preparation of wines.** *Beverage and Food World* 19(5): 1992; 16-17, 18

An attempt has been made to produce an acceptable quality fermented beverage (wine) from ber fruits. The preliminary studies showed that the wine from ber juice was comparable to that from grape juice except slight astringent taste. The rate of fermentation of ber juice was found to be slower than that of the grape juice. The cost of lab. scale production of ber wine was Rs. 26.75/litre as compared to Rs. 20.00/litre for grape wine. AA

## Non-alcoholic beverages

2186

Sethi (V). **Preparation and storage study of lime ginger cocktail at room and low temperature.** *Beverage and Food World* 19(5): 1992; 51-52

## Fruit juices

2187

Steinhardt (H) and Petzinna (H). **Automatic analysis of fruit juices.** *Deutsche Lebensmittel-Rundschau* 88(1): 1992; 1-9 (De)

The use of an automatic analyser for determining of 13 different parameters for the analysis of fruit juice (D-glucose, D-fructose, sucrose, D-sorbitol, L-malic acid, L-ascorbic acid, citric acid, D-isocitric acid, acetic acid, ethanol, D- and L-lactic acid and nitrate) is described. Adaptions of enzymatic determinations usually succeeded with negligible modifications of conventional manual detn. methods. For detn. of ascorbic acid and nitrate methods has to be adapted to the equipment and conceptional conditions of the automatic analyser. Linearity, precision and correctness of the methods investigated were very good. In most cases the range of measuring definable for the analyser, with the automatic dilution taken into consideration, could be enlarged by factors between 5 and 20 as compared to manual methods. Comparisons of



methods of all detn. when measuring various samples of fruit juices were judged very good. Automation of fruit juice analysis offers higher precision in results by automation of manual procedures, high sample throughput (up to 300 samples per hr) and also the possibility of efficiently proceeding smaller series of analysis by a fast change of methods, saving reagents. AA

2188

Neradt (F). **Particle-free clear fruit juices.** *Beverage and Food World* 19(5); 1992; 21

### Apple juices

2189

Hanger (LY) and Penfield (MP). **Sample/rinse temperature effects on discrimination of sweet and salty differences in a food system.** *Journal of Sensory Studies* 8(1); 1993; 1-11

The ability of panelists to distinguish between samples of apple juice with 2 levels of added sucrose (0.1 and 0.9 g/100 mL) or NaCl (0.05 and 0.14 g/100 mL) was determined using a modified signal detection technique. Samples at various temp. (6, 24 or 50°C) were presented with various rinse conditions. Sometimes a water rinse (6, 24 or 50°C) was presented between samples and sometimes not. R-index values were calculated to predict the ability of panelists to distinguish between samples. No temp. effect was found for sweetness difference tests; however, R-indices showed that salty differences in apple juice were more distinguishable at a sample temp. of 24°C than at 6 or 50°C. Samples temp. had a greater effect than rinse condition (temp. or no rinse) on discrimination between samples differing in NaCl concn. AA

### Cider

2190

Singh (RP), Gupta (AK), Bhatia (AK), Harbans Singh and Gaur (GS). **Production of fermented cider from Kashmir apples.** *Beverage and Food World* 19(5); 1992; 48-50

### Citrus juices

2191

Widmer (WW), Cancalon (PF) and Nagy (S). **Methods for determining the adulteration of citrus juices.** *Trends in Food Science and Technology* 3(11); 1992; 278-286

Reviews the adulteration of citrus juices by the undeclared addition of sugar and pulp wash, the

admixture of juices, the addition of colourants, amino acids and organic acids; and the evaluation of several methods for detecting juice adulteration such as isotopic analysis, site-specific natural isotope fractionation-nuclear magnetic resonance HPLC, trace addition, electrochemical detection, pattern recognition analysis, UV/VIS spectrophotometry and inductively coupled plasma-atomic emission spectroscopy (ICP-AES). 77 references. GS

### Orange juices

2192

Barbary (O), Nonaka (R), Delwiche (J), Chan (J) and O'Mahony (M). **Focussed difference testing for the assessment of differences between orange juices made from orange concentrate.** *Journal of Sensory Studies* 8(1); 1993; 43-67

Focused difference testing was applied to 2 orange juices prepared from frozen concentrate. Differences were noted between the juices for darkness of colour, visual appearance of pulpiness, resistance to tongue movement, flavour by mouth, odor, overall taste and taste other than sweetness. The logic and approach of focused difference testing is discussed and contrasted with other sensory analytical techniques. AA

2193

Takahashi (Y), Ohta (H), Yonei (H) and Ifuku (Y). **Microbicidal effect of hydrostatic pressure on Satsuma mandarin juice.** *International Journal of Food Science and Technology* 28(1); 1993; 95-102

Six microbial strains were inoculated into Satsuma mandarin (*Citrus unshiu* Marc.) juices and the effects of hydrostatic pressure on their viability were examined. Five microorganisms were substantially inactivated under 400 MPa at room temp. for 5 min whereas *B. subtilis* survived. The effects achieved by treating at 57°C under 100 MPa for 5 min were comparable to those achieved by treating under 400 MPa at room temp. for 5 min. Pectinesterase was not inactivated even after treating at 600 MPa and 57°C for 5 min. Although the high pressure treatment exerted hardly any effect on juice chemical components, the pulp particle size distribution was slightly changed by treating under 600 MPa at room temp. for 30 min. Pressure treatment had little effect on the volatile flavour components. AA



2194

Zhang (SQ), Fouda (AE) and Matsuura. **Reverse osmosis transport and module analysis for green tea juice concentration.** *Journal of Food Process Engineering* 16(1); 1993; 1-20

Results indicate that the osmotic pressure of the green tea juice (GTJ) concn. is the same as those of fruit juices for a given carbon wt. fraction of the solute. Both solute transport parameter and mass transfer coeff. (MTC) of the GTJ components decrease with an increase in the GTJ concn. with an increase in the operating pressure (OP). An increase in OP reduces the module length required to obtain a given fraction product recovery enormously, particularly when the GTJ concn. is high. An increase in the MTC on the GTJ component on the high pressure side of the membrane also reduces the module length. BV

### FATS AND OILS

2195

Bhakare (HA), Khotpal (RR) and Kulkarni (AS). **Lipid composition of *Withania somnifera*, *Phoenix sylvestris* and *Indigolera enualphylla* seeds of Central India.** *Journal of Food Science and Technology (India)* 30(5); 1993; 382-384

Total lipids of *W. somnifera* (Solanaceae), *Ph. sylvestris* (Palmaeae) and *Ind. enualphylla* (Leguminosaeae) seeds were 14.0, 10.2 and 4.4% and consisted of neutral lipids (87.7 - 90.2%), glycolipids (5.8 - 7.3%) and phospholipids (3.6 - 5.0%). Neutral lipids consisted of triacylglycerols (87.0 - 88.5%) with small amounts of monoacylglycerols, diacylglycerols, free fatty acids, free sterols, sterol esters and hydrocarbons. The glycolipids were predominantly digalactosylglycerol, and acylated-sterylglucoside with small quantities of sterylglucoside and monogalactosylglycerol. The phospholipids (PL) consisted of phosphatidylcholine (PC), phosphatidylethanolamine (PE), phosphatidyl inositol (PI), and cardiolipin (CL) with trace amounts of lysophosphatidylcholine (LPC) and lysophosphatidylethanolamine (LPE). The fatty acid composition of all the lipid material showed the preponderance of palmitic and oleic acids. AA

### Oils

2196

Datta (DK) and Chaudhuri (DK). **Edible oils and vanaspati - standardization of flexible packaging material.** *ISI Bulletin* 7(6); 1993; 173-175

Indian scene, standardization (Indian Standards on thermoplastics for food packaging, flexible packs for the packing of vanaspati, flexible packaging materials for packing of refined edible oils), legislation and implementation, problems and constraints are covered. SRA

2197

Uauy-Dagach (R) and Valenzuela (A). **Marine oils as a source of  $\omega$ -3-fatty acids in the diet: How to optimize the health benefits.** *Progress in Food and Nutrition Science* 16(3); 1992; 199-243

Reviews the importance of  $\omega$ -3-poly unsaturated fatty acids (PUFA) in health and disease; marine oils as a source of  $\omega$ -3-fatty acids in the diet;  $\omega$ -3-fatty acid content, its variability and sources of variability in marine foods; extraction and preservation of  $\omega$ -3-fatty acids from marine oils; prevention of oxidative rancidity of marine oil fractions; incorporation of  $\omega$ -3-fatty acids in diets; changes in dietary habits and food consumption pattern; and the modified intake of  $\omega$ -3-fatty acid for better health. 181 references. GS

### Coconut oils

2198

Prasad (PBV). **Effect of additives on liquid-solid transformation in coconut oil.** *Journal of Food Science and Technology (India)* 30(5); 1993; 355-356

The effect of admul, myverol and lecithin on the nucleation in coconut oil was studied through the measurement of nucleation temp.; light scattering method was employed for measurement of nucleation temp. Lecithin and myverol were found to be effective in suppressing the nucleation to different levels. The mechanisms involved are discussed. AA

### Mustard oils

2199

Sarkar (S) and Bhattacharyya (DK). **Nutrition of interesterified mustard oil.** *Oleagineux* 47(12); 1992; 713-718

The nutritional status of high erucic mustard oil can be significantly improved after randomisation of the oil. The digestibility of mustard oil, animal growth response and food efficiency ratios improve when mustard oil is ingested as a randomised oil and the results become comparable with those of low erucic rapeseed oil. The total lipid content and its components such as triglyceride, total and free cholesterol have been significantly reduced in serum

with dietary randomised mustard oil compared with the original mustard oil. In liver, heart and kidney tissues, the cholesterol level is significantly reduced on randomisation. In serum and all tissues, erucic acid is deposited in insignificant amounts in the case of original mustard oil and randomised oil. AA

## SPICES AND CONDIMENTS

2200

Central Food Technological Research Institute (Mysore). **9th Annual Conventional of Indian Association for Cancer Research and National Symposium on Cancer Research. Mysore. 14th - 16th March 1990, Spices Board, Cochin. ix+71: 1990**

This article includes the abstracts of papers presented at the symposia such as anti-tumor and anti-carcinogenic activity of spices by Unnikrishnan, M. C. (pp. 28); food and environmental carcinogens by Annapurani, S. (pp. 29); cancer risk and cancer protection associated with various food dishes and food components by Krishnakumar, A.; Balachandran, B.; Balanchru, S.; Sivaswamy, S. N. and Sivaramakrishnan, V. M. (pp. 30-31). CSA

2201

Spices Board (Government of India Cochin). **I Conference on Research and Production of Spices, Bangalore. 13th December 1987, Spices Board, Cochin 1-97: 1988**

The papers presented in this conference include the production and productivity of major spices, post-harvest technology and role of spices board by Antony Cherian (pp. 20-33); Development of spices by Velappan, E. (pp. 34-45); Research on cardamom: programmes and prospects by Naidu, R. (pp. 46-49); Research activities and accomplishments by Nair, M. K. (pp. 50-55); Spices development in Karnataka by Guruswamy (pp. 56-58); Pepper development in Kerala by Suseelan, P. (pp. 59-60); Spices and condiments crops in Andhra Pradesh by Rahiman, M. A. (pp. 61-63); Spices production in Tamil Nadu by Mahalingam (pp. 64); Spices export by Mariwala, J. V. (pp. 65-67); Import substitute for cardamom by Reshmi Bhijiani (pp. 67-69); Spices curing and quality of Ashwin J. Shah (pp. 70-73); Taxation and export value added products by George Paul (pp. 74); Spices productivity and development by Ajit Thomas (pp. 75-83); Cumin - bright prospects by Shankerlal Guru (pp. 84-93); Stable price a pre-requisite by Joseph Monipalli (94-95); Large cardamom in Sikkim by Bharat Mani Pradhan (96-97). CSA

## Condiments

## Papads

2202

Kulkarni (SG), Manan (JK) and Shukla (IC). **Preparation, evaluation and storage of papad made from rice flakes (poha) flour and unripe banana. Beverage and Food World 19(5): 1992 13-15, 18**

Optimum conditions for the preparation of a savoury snack product viz. 'papad' from the rice flake (poha) flour and cooked, unripe banana pulp mix have been standardised. The blend containing 40 parts of poha flour and 60 parts of cooked banana pulp on dry wt. basis yielded papads with acceptable colour, texture, flavour etc. upon deep fat frying. Physico-chemical characteristics of papads have been determined and their sensory quality attributes upon deep fat frying during storage period of 4 months at room temp. have also been evaluated. Sorption isotherm studies revealed that ERH of the product was 68.2% with initial moisture content of 12.0%. Moisture content of 13.9% was found to be critical from the point of quality characteristics of the product. Storage of the product in LDPE and polypropylene (PP) bags indicated that 250 gauge LDPE bags were better than 100 gauge LDPE bags providing a shelf-life of about 120 days at ambient condition (25-39°C) and 40-86% RH. Polypropylene bags were still better than 250 gauge LDPE bags keeping in view the economy and better transparency. Sensory quality of fried papads remained quite acceptable upto 4 months storage in respect of colour, texture and flavour under ambient conditions. AA

## Essential oils

2203

Bhattacharya (SC), Sen (N) and Sethi (KL). **11th International Congress of Essential Oils, Fragrances and Flavours - Chemistry, Analysis and Structure. New Delhi, India. 12th - 16th November, 1989. 81-204-0463-7. Oxford and IBH Publishing Co. Pvt. Ltd. 4: 1989; V+270**

This volume covers the paper presented by Mathew A. G. on oil and oleoresin from Indian spices (pp. 189-195). CSA

2204

Bhattacharyya (SC), Sen (N) and Sethi (KL). **11th International Congress of essential oils, fragrances and flavours - Biosciences. New Delhi, India. 12th - 16th November, 1989. 81-204-0462-9, Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi. 3: 1989; V+133**



This vol. includes the paper presented by Krishnan G. Gupta, Renuka Singhal and Meenakshi Gupta on microbial production of diacetyl - a dairy flavour (pp. 113-117). CSA

## Orange oils

2205

Braunsdrof (R), Hener (U), Przibilla (G), Plecha (S) and Mosandl (A). **The influence of analytical and technological procedures on the  $^{13}\text{C}/^{12}\text{C}$  isotope ratio of orange oil compounds.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 197(1): 1993: 24-28 (De)

The influence of chromatographic and technological procedures on the  $^{13}\text{C}$ -isotope value of flavour compounds from orange oils was investigated. In order to avoid misinterpretations of isotopic data, quantitative yield during sample clean-up must be ascertained. Ordinary as well as deterpenated orange oils were not influenced by the technological processing. In the case of special products containing single compounds conc. up to more than 70%, a shift in the  $^{13}\text{C}/^{12}\text{C}$ -isotope ratio was detectable. AA

## Spices

### Turmeric

2206

Goyal (RK) and Korla (BN). **Changes in the quality of turmeric rhizomes during storage.** *Journal of Food Science and Technology (India)* 30(5): 1993: 362-364

Both cured and uncured dried rhizomes for 4 turmeric (*Curcuma longa* L.) cvs were examined for changes in curcumin, essential oils, and oleoresins during 12 months storage at ambient temp. Curcumin content continued to decline upto 10 months, but the change, thereafter, was minor. However, essential oil and oleoresins decreased throughout the storage period. The max. losses in curcumin, essential oils and oleoresins were 23.4, 27.5 and 24.2%, respectively, after 12 months in cured rhizomes of cv 'EM-321' and uncured rhizomes of cv. 'PCT-2'. AA

2207

Vijaya Kumar (GV), Srinivasa Reddy (K), Seshagiri Rao (M) and Ramavatharam (N). **Soil and plant characters influencing curcumin content of turmeric.** *Indian Cocoa, Arecanut* 15(4): 1992: 102-105

The factors that influence the curcumin accumulation in turmeric rhizomes were studied. Positive correlations were obtained between soil organic carbon, available N and available Mn and the curcumin content of turmeric which eventually suggest the need for application of higher quantities of organic fertilizers and N and Mn fertilizers in order to increase the curcumin content in rhizomes. Of the var. tested, "Duggirala" var. was found to be superior to "Mydukur" var. with respect to the curcumin content, and "Suvarna (P.C.T.8)" contained the highest curcumin content (4.95%). AA

2208

Singh (VB), Swer (B) and Singh (PP). **Influence of nitrogen and potassium on yield and quality of turmeric cv. Lakadong.** *Indian Cocoa, Arecanut* 15(4): 1992: 106-108

Both N and K fertilizers significantly increased the yield of fresh and cured turmeric. The nitrogenous fertilizer could significantly increase the curcumin accumulation in rhizome. At 80 kg N/ha the curcumin content was highest. 80 kg  $\text{P}_2\text{O}_5$  and 80 kg  $\text{K}_2\text{O}$  per ha were also considered as optimum dose for increasing productivity of turmeric and curcumin content in the rhizome. GS

## SENSORY EVALUATION

2209

Yu-Ling Kuo, Panglorn (RM) and Noble (AC). **Temporal patterns of nasal, oral and retronasal perception of citral and vanillin and interaction of these odourants with selected tastants.** *International Journal of Food Science and Technology* 28(2): 1993: 127-137

Perceived intensities of aqueous solutions of 0.01% citral (C) and of 0.14% vanillin were estimated over time when presented nasally (sniffing), retronasally (sipping) and orally (sipping with nose pinched). The onset and decay of nasal perception was very rapid, with max. intensity reached between 4-8s and extinction between 9-15s. The oral response was extremely low, while retronasal intensity reached max. 11-19s after stimulation with a duration ranging from 40 to 120s. Orally, 10 of 19 subjects rated sol. containing C and citric acid (CA) significantly higher than those containing CA alone. Retronasally, citral intensity was enhanced by  $\text{CA} > \text{CA} + \text{sucrose (SUC)} > \text{SUC} > \text{NaCl}$ . Addition of xanthan gum had little effect on perception of citral. Retronasal intensity of vanillin sol. was increased by addition of SUC and depressed by CA and by NaCl. The results demonstrated large differences in perceived intensity and duration via the 3



procedures, significant alteration of oral intensity by added tastants, and marked bimodality of response upon the addition of acid to citral. AA

2210

Bett (KL), Shaffer (GP), Vercellotti (JR), Sanders (TH) and Blankenship (PD). **Reducing the noise contained in descriptive sensory data.** *Journal of Sensory Studies* 8(1); 1993: 13-29

A data reduction protocol was designed to minimize distortion inherent in sensory data. Following removal of nonexistent attributes and treatment levels, extreme value analysis and distribution comparisons combined with graphical representation, facilitated elimination of inconsistent (with respect to overall consensus) panelists. Application of a calibration factor showed super responsive panelists (those with intensity values consistently higher than other panelists) were among the most accurate and thus were retained in spite of their tendency to produce extreme value data. Panelists that consistently produced a narrow variance around the overall mean and rarely produced extreme values were classified as noncommittal and removed. Analysis of variance calls for a split plot design: blocks (sessions) and treatments in main plot, and panelists in subplot. In general, the subplot can be ignored. These methods are suggested for evaluating panelists' training needs; and for eliminating data that distorts the statistical analysis. AA

2211

Tanimura (S) and Mattes (RD). **Relationship between bitter taste sensitivity and consumption of bitter substances.** *Journal of Sensory Studies* 8(1); 1993: 31-41

The effect of consumption of bitter taste substances (caffeine and beer) to bitter taste sensitivity was examined by 19 healthy adults. For individual taste sensitivity, detection thresholds were used on 6 bitter substances (caffeine, iso- $\alpha$ -acids: beer bittering agents, quinine sulphate, L-tryptophan, L-phenylalanine and glycyl-L-phenylalanyl-L-phenylalanine) and 3 non-bitter substances (L-aspartic acid, aspartame and NaCl). Nonusers of caffeine had significantly higher sensitivity (lower threshold) for caffeine compared to moderate and heavy users. Slight consumers of beer had significantly higher sensitivity for iso- $\alpha$ -acids relative to heavy users of beer. Iso- $\alpha$ -acids were not detected in saliva in acute dosing test by using 6 subjects. The correlations between thresholds of 6 bitter substances were calculated. Significant correlations ( $p < 0.01$ ) were noted in 2 cases between caffeine and quinine, and

iso- $\alpha$ -acids and L-tryptophan. These data suggest the significant relation between individual bitter taste sensitivity and the consumption of caffeine and beer (iso- $\alpha$ -acids). AA

## FOOD STORAGE

Nil

## INFESTATION CONTROL AND PESTICIDES

2212

Ramachandran (PK), Sukumaran (D), Rao (SS). **Entomology for defence services. Proceedings of the symposium. Gwalior. 12th - 14th September, 1990. Defence Research and Development Establishment, Gwalior-474 002. 1-273: 1991**

This symposium includes the abstracts and papers presented on integrated pest management in grain storage system by Doharey, R. B. (pp. 209-218); Deltamethrin as an alternative prophylactic insecticide in grain storage by Babu, C. J. (pp. 226-230); Effect of host seed species on growth and larval energetics of *Callosobruchus maculatus* (F.) by Chandrakantha, J.; Suseela, K. P. and Sethulakshmi, T. (pp. 231-238) and Disinfestation of stored pulses with gamma radiations by Madhu Gill and Pajni, H. R. (pp. 239-243). CSA

## BIOCHEMISTRY AND NUTRITION

2213

Anand (AN) and Seshadri (S). **Role of citric acid on iron availability in a model system.** *Journal of Food Science and Technology (India)* 30(5); 1993: 371-373

Role of citric acid in overcoming the effects of polyphenols and calcium phosphate salts on Fe availability in a model system was investigated. Citric acid showed the potential as good as ascorbic acid in counteracting the inhibitory effects of tannate and calcium phosphate on Fe availability. SD

2214

Velev (OD), Nikolov (AD), Denkov (ND), Doxastakis (G), Kiosseoglu (V), Stalidis (G). **Investigation of the mechanisms of stabilization of food emulsions by vegetable proteins.** *Food Hydrocolloids* 7(1); 1993: 55-71



The different microheterogeneous components of a vegetable protein stabilized corn oil in water dispersion, close to the ones used in industrial practice are investigated. Experimental techniques used to uncover the physical mechanisms, controlling the behaviour and stability of the emulsion system include dynamic light scattering for examining the size of the colloid species in the initial aqueous protein sol., zeta-potential measurements of the proteins aggregates and corn oil drops as well as investigation of the surface dilational properties of protein covered oil drops by capillary pressure measurements and of the thickness and stability of thin aqueous films by the microinterferometric technique. The stability and rheological behaviour of batch protein emulsions are briefly examined in order to check that the studied vegetable protein species can serve as effective stabilizers. SD

## TOXICOLOGY

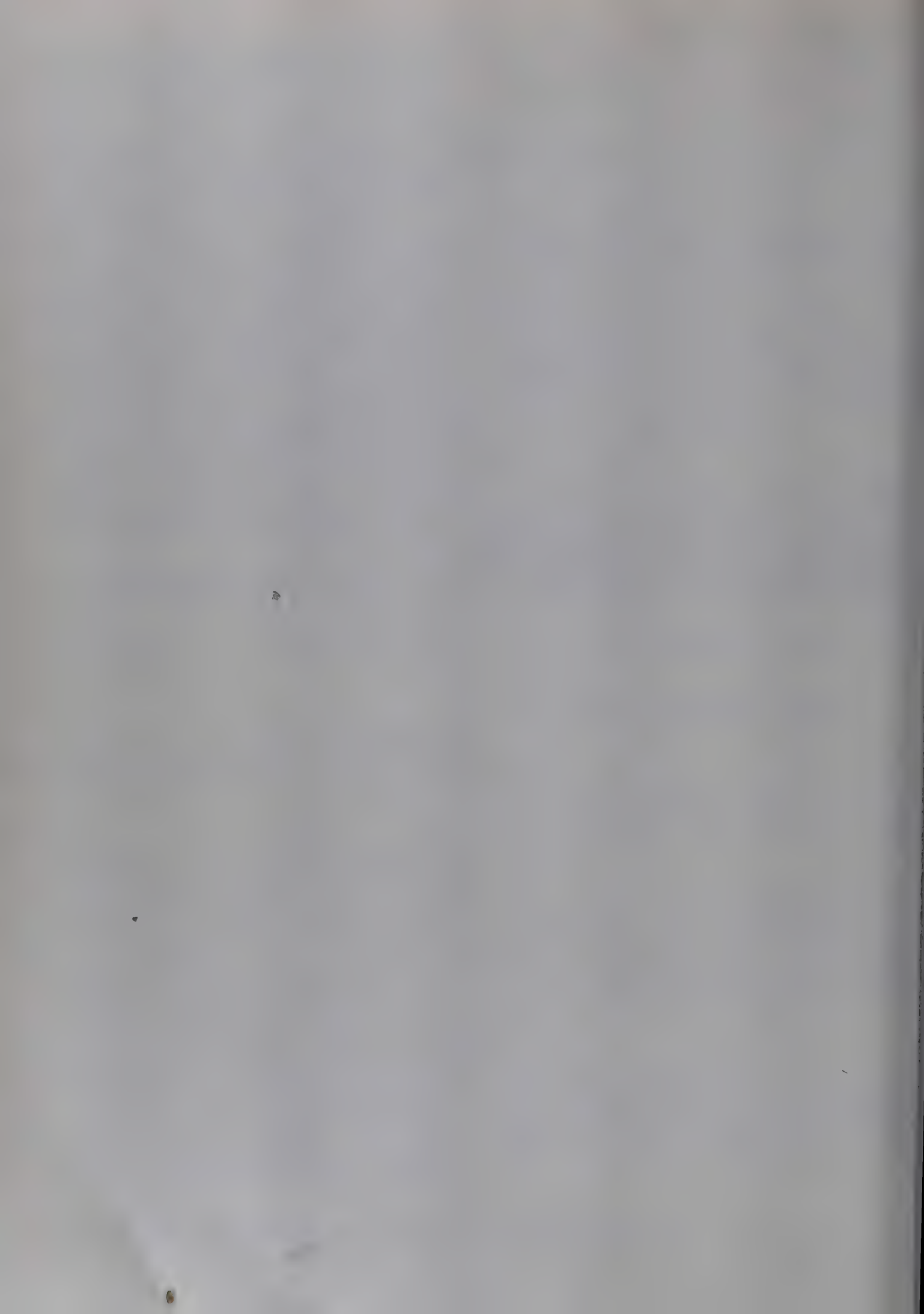
2215

Park (DL) and Walker (R). **International symposium and workshop on food contamination, mycotoxins and phycotoxins (cairo, Egypt, 4 - 15 November 1990).** *Food Additives Contamination* 10(1): 1993; 1-156

Following papers were presented at the symposium and workshop. Key elements of food contamination monitoring programmes by Galal-Gorchev, H. (pp 1-4); Assessment of human exposure to chemical contaminants in foods by Conacher, H. B. S. and Mes, J. (pp 5-15); Mycotoxins in review by Pohland, A. E. (pp 17-18); Rationale for regulatory programmes for mycotoxins in human foods and animal feeds by Egmond, H. P. van (pp 29-36). Recent advances in analytical methods for mycotoxins by Gilbert, J. (pp 37-48); Perspectives on mycotoxin decontamination procedures by Park, D. L. (pp 49-50); International coordination and validation of analytical methods by Hortwitz, W. (pp 61-69); Recent methods for detection of seafood toxins: recent immunological methods for ciguatoxin and related polyethers by Hokama, Y. (pp 71-82); Immunological studies using monoclonal antibodies for detection of 4 low dalton marine toxins by Hokama, Y. (pp 83-95); Importance of international cooperation by Canet, C (pp 97-104); Dietary intake levels in food and estimated intake of lead, cadmium, and mercury by Galal-Gorchev, H (pp 115-128); Industrial chemical contamination of foods by Conacher, H. B. S, Page B. D. and Rayan, J. J. (pp 129-143); Diet/toxin interactions by Veno, Y. (pp 145-156). BV

## FOOD LAWS AND REGULATIONS

Nil





# AUTHOR INDEX

- Adhikari (AK)  
 2147  
 Adhikary (RK)  
 2047  
 Adsule (RN)  
 2185  
 Aggett (PJ)  
 2035  
 Agudelo (J)  
 2184  
 Aguerre (RJ)  
 2106  
 Aguilera (JM)  
 2141  
 Akesson (G)  
 2062  
 Ammon (J)  
 2167  
 Anand (AN)  
 2213  
 Antai (SP)  
 2081  
 Aquili (V)  
 2163  
 Armbruster (BL)  
 2140  
 Arulmozhi (M)  
 2093  
 Arya (SS)  
 2130  
 Autio (K)  
 2132  
 Autio (T)  
 2032  
 Awuah (GB)  
 2024  
 Bains (GS)  
 2144  
 Bakker-Arkema (FW)  
 2027  
 Bangladesh Agricultural  
 Research Institute  
 2089  
 Baranyi (J)  
 2039  
 Barbary (O)  
 2192  
 Barbut (S)  
 2169  
 Bawa (AS)  
 2122  
 Bekes (F)  
 2135  
 Beldman (G)  
 2087  
 Bell (RG)  
 2160  
 Beltiz (H-D)  
 2157  
 Bemiller (JN)  
 2080  
 Ben-Hdech (H)  
 2094  
 Bergeuin (M)  
 2114  
 Berry (SK)  
 2096  
 Bertelsen (G)  
 2158 2161  
 Berwal (J)  
 2159  
 Betschart (AA)  
 2067  
 Bett (KL)  
 2210  
 Bhabha Atomic Research  
 Centre (Bombay)  
 2036  
 Bhakare (HA)  
 2195  
 Bhandari (R)  
 2048  
 Bhatia (AK)  
 2190  
 Bhatnagar (AP)  
 2126  
 Bhattacharyya (DK)  
 2199  
 Bhattacharyya (PR)  
 2047  
 Bhattacharyya (SC)  
 2203 2204  
 Bhole (NG)  
 2103  
 Bhullar (AS)  
 2016  
 Biro (G)  
 2164  
 Bjorn (H)  
 2158  
 Blankenship (PD)  
 2210  
 Blanshard (JMV)  
 2156  
 Bordoloi (DN)  
 2047  
 Boruah (M)  
 2033  
 Bouraoui (M)  
 2034  
 Braunsdrof (R)  
 2205  
 Brosio (E)  
 2092  
 Buchanan (RL)  
 2044  
 Bumberger (E)  
 2157  
 Bureau (G)  
 2049  
 Bushuk (W)  
 2077 2137  
 Camire (ME)  
 2123  
 Campbell (S)  
 2040  
 Cancalon (PF)  
 2191  
 Carnovale (E)  
 2092  
 Case (SE)  
 2074  
 Castro (M)  
 2101  
 Central Food Technological  
 Research Institute (Mysore)  
 2200  
 Chakrabarty (TK)  
 2130  
 Champagne (CP)  
 2148  
 Chan (J)  
 2192  
 Chandrasekharan Nair  
 2098  
 Chandrashekar (A)  
 2084 2085  
 Chang (S-M)  
 2066  
 Charan (R)  
 2116  
 Chaudhuri (DK)  
 2196  
 Chauhan (J)  
 2138  
 Cherian (S)  
 2098  
 Choudhury (S)  
 2033  
 Chougule (BA)  
 2185  
 Churey (JJ)  
 2109  
 Clark (D)  
 2101  
 Clyne (J)  
 2182  
 Conner (JM)  
 2182  
 Curtis (PS)  
 2134

Cruchajowska (Z)  
 2059 2060  
 Datta (DK)  
 2196  
 Defence Food Research  
 Laboratory Mysore  
 2020  
 Defence Research and  
 Development Establishment  
 2212  
 Deighton (N)  
 2031  
 de la Fuente (MA)  
 2150  
 Delincee (H)  
 2167  
 Delost-Lewis (K)  
 2082  
 Delwiche (J)  
 2192  
 Dendy (DAV)  
 2086  
 Denkov (ND)  
 2214  
 Department of Food  
 Technology and Biochemical  
 Engineering, Calcutta  
 2053  
 Desai (N)  
 2140  
 Dharam Pal  
 2143  
 Di Nola (A)  
 2092  
 Dou (J)  
 2017  
 Doxastakis (G)  
 2214  
 Duprat (F)  
 2165  
 Dziuba (J)  
 2142  
 Eckhoff (SR)  
 2078  
 Eckner (KF)  
 2038  
 Egbuna (HI)  
 2097  
 Ekstrand (B)  
 2062 2176  
 Ellis (WO)  
 2046  
 Enkelmann (R)  
 2183  
 Ereifej (KI)  
 2068  
 Evranuz (EO)  
 2100  
 Fannon (JE)  
 2080

Feng (JJ)  
 2178  
 Fichtali (J)  
 2034  
 Figge (K)  
 2023  
 Fletcher (GC)  
 2174  
 Flint (SI)  
 2123  
 Fontecha (J)  
 2150  
 Fouda (AE)  
 2194  
 Fouques (D)  
 2071  
 Gahlawat (P)  
 2056  
 Gaines (CS)  
 2139  
 Gallant (DJ)  
 2094  
 Gangby (I)  
 2062  
 Gao (L)  
 2077  
 Garcha (HS)  
 2048  
 Garcia (HH)  
 2101  
 Garg (N)  
 2109  
 Gaur (GS)  
 2190  
 Georges (AN)  
 2117  
 Gianjagna (TJ)  
 2119  
 Gidamis (AB)  
 2108  
 Gilman (R)  
 2101  
 Gilmour (A)  
 2146  
 Glidewell (SM)  
 2031  
 Goffreda (JC)  
 2119  
 Gomez (MI)  
 2086  
 Gonzales (AE)  
 2101  
 Goodman (BA)  
 2031  
 Gopalarno (C)  
 2126  
 Goswami (TD)  
 2033  
 Goyal (RK)  
 2206

Greenwood (MH)  
 2045  
 Grotte (MG)  
 2165  
 Grove (MJ)  
 2079  
 Gueguen (J)  
 2094  
 Gupta (AK)  
 2190  
 Gupta (S)  
 2143  
 Gussman (CD)  
 2119  
 Haarasilta (S)  
 2037  
 Hagyard (CJ)  
 2160  
 Hamaker (BR)  
 2101  
 Hamann (DD)  
 2074  
 Hanger (LY)  
 2189  
 Hannah (MC)  
 2135  
 Harada (T)  
 2127  
 Haravu (LJ)  
 2102  
 Harbans Singh  
 2190  
 Hardmeier (RM)  
 2101  
 Hatcher (DW)  
 2072  
 Hazarika (M)  
 2164  
 He (H)  
 2136  
 Hener (U)  
 2205  
 Heureux (GPL)  
 2114  
 Hilpert (HA)  
 2023  
 Hofer (PJ)  
 2067  
 Hollemans (M)  
 2087  
 Hoppner (K)  
 2088  
 Hori (K)  
 2043  
 Hosenev (RC)  
 2136  
 House (LR)  
 2086  
 Hruschka (WR)  
 2075



idson (JA)  
 175  
 ugelshofer (W)  
 018  
 wang (J)  
 028  
 uku (Y)  
 193  
 udharaswamy (YM)  
 063  
 oue (Y)  
 137  
 International Center  
 for Agricultural Research  
 in the Dry Areas  
 091  
 International Crops  
 Research Institute for the  
 Semi-Arid Tropics  
 091  
 ulappan (I)  
 121  
 ain (SK)  
 180  
 Jana (AH)  
 152  
 Janardhanan (K)  
 2093  
 Jane (J)  
 2125  
 Jaurez (M)  
 2150  
 Jayanthi (S)  
 2102  
 Jepsen (PC)  
 2018  
 Joshi (N)  
 2104  
 Kadam (SS)  
 2185  
 Kairiyama (E)  
 2170  
 Kalichevsky (MT)  
 2156  
 Kanawjia (SK)  
 2149  
 Kanekar (P)  
 2104  
 Kano (H)  
 2041  
 Karl (H)  
 2172  
 Kavitha (R)  
 2085  
 Kelkar (A)  
 2104  
 Khanizadeh (S)  
 2046  
 Khanna (PK)  
 2048

Khotpal (RR)  
 2195  
 Kim (SS)  
 2076  
 Kinsella (JE)  
 2141  
 Kiosseoglu (V)  
 2214  
 Kirkland (JJ)  
 2072  
 Klawitter (LA)  
 2044  
 Knutson (CA)  
 2079  
 Kohlstad (I)  
 2101  
 Kokini (JL)  
 2028  
 Korla (BN)  
 2206  
 Kotecha (PM)  
 2185  
 Kotwaliwale (N)  
 2180  
 Kroll (RG)  
 2040  
 Kruger (JE)  
 2072  
 Kuchroo (TK)  
 2019  
 Kulkarni (AS)  
 2195  
 Kulkarni (PR)  
 2133  
 Kulkarni (SD)  
 2103  
 Kulkarni (SG)  
 2202  
 Kulshrestha (SB)  
 2171  
 Lalande (M)  
 2018  
 Lampi (B)  
 2088  
 Landry (J)  
 2071  
 Latha Sabikhi  
 2149  
 Lauriere (M)  
 2071  
 Lawrence (LM)  
 2146  
 Lawton (JW)  
 2131  
 Leisola (M)  
 2037  
 Lelieveld (HLM)  
 2018  
 Lescano (G)  
 2170

Lescano (M)  
 2101  
 Lim (H)  
 2073 2128  
 Litchfield (JB)  
 2026  
 Litopoulou-Tzanetaki (E)  
 2151  
 Livingstone (AS)  
 2178  
 Lonner (C)  
 2061  
 Lonsane (BK)  
 2030  
 Lopez-Briones (G)  
 2049  
 Lorenz (K)  
 2082  
 Lucotte (T)  
 2112  
 Luo (Y)  
 2118  
 Mabon (TJ)  
 2029  
 Malleshi (NG)  
 2178  
 Manan (JK)  
 2202  
 Marchylo (BA)  
 2072  
 Marconi (E)  
 2092  
 Marklinder (I)  
 2061  
 Mathur (BN)  
 2179  
 Matsuura  
 2194  
 Mattes (RD)  
 2211  
 Mazher (H)  
 2084  
 McClure (P)  
 2039  
 McCormick (KM)  
 2070  
 McDonald (D)  
 2102  
 McEvoy (TG)  
 2052  
 Mehan (VK)  
 2102  
 Mielche (MM)  
 2161  
 Mildau (G)  
 2167  
 Mistry (AH)  
 2078  
 Mittar (D)  
 2048

Mohamed (AI)  
 2105  
 Moreira (RG)  
 2027  
 Morris (CE)  
 2112  
 Morrison (IM)  
 2031  
 Morrison (WR)  
 2057 2058  
 Mosandl (A)  
 2205  
 Mostert (MA)  
 2018  
 Motoki (M)  
 2042  
 Mott (SJ)  
 2175  
 Muir (DD)  
 2145  
 Mulimani (VH)  
 2083  
 Muller (H)  
 2110  
 Mushtari Begum (J)  
 2129 2168  
 Nagy (S)  
 2191  
 Nair (BM)  
 2064  
 Nakai (S)  
 2017  
 Narasimhan (KS)  
 2063  
 Narvaiz (P)  
 2170  
 Nassaur (J)  
 2018  
 Natesan (V)  
 2130  
 Neradt (F)  
 2188  
 Newman (CW)  
 2067  
 Newman (RK)  
 2067  
 Ng (PKW)  
 2077  
 Niemi (E)  
 2032  
 Nikolov (AD)  
 2214  
 Nilsson (K)  
 2176  
 Noble (AC)  
 2209  
 Nonaka (R)  
 2192  
 Norris (KH)  
 2075

Nzeribe (E)  
 2081  
 O'Brien (GM)  
 2108  
 O'Brien (L)  
 2135  
 O'Lidha (G)  
 2165  
 O'Mahony (M)  
 2138 2192  
 Obizoba (IC)  
 2097  
 Ogbonna (DN)  
 2099  
 Ohta (H)  
 2193  
 Okita (T)  
 2043  
 Okiyama (A)  
 2041 2042  
 Oldham (JH)  
 2046  
 Omre (PK)  
 2095  
 Ozimek (L)  
 2142  
 Padmanabhan (S)  
 2124  
 Pandey (JP)  
 2065  
 Panglorn (RM)  
 2209  
 Panozzo (JF)  
 2070 2135  
 Park (DL)  
 2215  
 Pascat (B)  
 2049  
 Paterson (A)  
 2182  
 Patterson (ME)  
 2118  
 Paukstelis (JV)  
 2073 2128  
 Payannavar (CS)  
 2133  
 Payne (MJ)  
 2040  
 Pearce (J)  
 2146  
 Pechak (DG)  
 2022  
 Peleg (M)  
 2025  
 Penfield (MP)  
 2189  
 Penney (N)  
 2160  
 Pensala (O)  
 2032

Petzinna (H)  
 2187  
 Piecha (S)  
 2205  
 Piggott (JR)  
 2182  
 Pinnioja (S)  
 2032  
 Pitotti (A)  
 2163  
 Pomeranz (Y)  
 2059 2060  
 Poulter (NH)  
 2108  
 Prasad (PBV)  
 2198  
 Price (J)  
 2035  
 Przibilla (G)  
 2205  
 Pyun (YR)  
 2028  
 Radosavljevic (M)  
 2125  
 Rajorhia (GS)  
 2154  
 Ramachandran (PK)  
 2212  
 Ramakrishna (M)  
 2124  
 Ramaswamy (HS)  
 2024  
 Ramavatharam (N)  
 2207  
 Rangappa (M)  
 2105  
 Ranote (PS)  
 2122  
 Rao (SS)  
 2212  
 Ravi Sundar (M)  
 2153  
 Reddy (CR)  
 2154  
 Reiss (J)  
 2107  
 Renukumari  
 2168  
 Richard (P)  
 2034  
 Ringstrom (R)  
 2018  
 Roach (RR)  
 2136  
 Robert (P)  
 2094  
 Roberts (TA)  
 2039  
 Robinson (JJ)  
 2052



Rodriguez (T)  
2101  
Rooney (LW)  
2086  
Roudot (A-C)  
2165  
Rovedo (CO)  
2106  
Ruales (J)  
2064  
Ruge (W)  
2167  
Ryder (JM)  
2174  
Sah (PC)  
2065  
Sahoo (J)  
2159 2165  
Saini (SPS)  
2113 2122 2144  
Saito (K)  
2055  
Samoon (AH)  
2050  
Sanders (TH)  
2210  
Sanni (AI)  
2099  
Sarais (I)  
2163  
Sarkar (BC)  
2095  
Sarkar (S)  
2199  
Sarnaik (S)  
2104  
Sasaki (T)  
2127  
Savelkoul (FHM)  
2090  
Sawarkar (SK)  
2103  
Saxena (MC)  
2091  
Saxena (RP)  
2095  
Scanlon (MG)  
2134  
Schaefer (I)  
2181  
Schmidt (GR)  
2162  
Schulman (AH)  
2057  
Schwartz (SJ)  
2074  
Seelye (RJ)  
2174  
Sehgal (RC)  
2096

Sehgal (S)  
2056  
Seib (PA)  
2125  
Seiffert (B)  
2181  
Sen (N)  
2203 2204  
Seshadri (S)  
2213  
Seshagiri Rao (M)  
2207  
Sethi (KL)  
2203 2204  
Sethi (V)  
2186  
Setser (CS)  
2073 2076 2128  
Shaffer (GP)  
2210  
Shankaranand (VS)  
2030  
Sharma (GP)  
2116 2180  
Shelef (LA)  
2173  
Shetty (HS)  
2084  
Shibli (RA)  
2068  
Shirae (H)  
2041  
Shukla (IC)  
2202  
Simard (RE)  
2117  
Simpson (BK)  
2024 2046  
Sinda (E)  
2132  
Singh (BR)  
2171  
Singh (CK)  
2048  
Singh (CP)  
2126  
Singh (KSSN)  
2069  
Singh (MN)  
2179  
Singh (PP)  
2208  
Singh (RP)  
2069 2190  
Singh (S)  
2113 2149  
Singh (VB)  
2208  
Singhal (OP)  
2147

Singhal (RS)  
2133  
Skibsted (LH)  
2158  
Slaughter (DC)  
2075  
Smith (JP)  
2046  
Sobczynska (D)  
2073  
Sofos (JN)  
2162  
Sohrab  
2016  
Soni (GL)  
2048  
Spices Board, Cochin  
2201  
Splittstoesser (DF)  
2109  
Sreelakshmi  
2129  
Sreenan (JM)  
2052  
Srinivasa Reddy (K)  
2207  
Stalidis (G)  
2214  
Stapelfeldt (H)  
2158  
Stec (MG)  
2174  
Stecchini (ML)  
2163  
Steinberg (MP)  
2078  
Steinhardt (H)  
2187  
Suarez (C)  
2106  
Suarez (JA)  
2184  
Sukumaran (D)  
2212  
Supriya (D)  
2083  
Suzuki (S)  
2127  
Swaczyna (H)  
2181  
Swanson (BG)  
2118  
Swier (B)  
2208  
Szczodrak (J)  
2059 2060  
Takahashi (Y)  
2193  
Tammimga (S)  
2090

Taniguchi (H)  
2127  
Tanimura (S)  
2211  
Teotia (MS)  
2096  
Tester (RF)  
2057 2058  
Thangaraj (T)  
2120 2121  
Tiwari (CM)  
2166  
Tokarczuk (PF)  
2156  
Toma (S)  
2017  
Torreggiani (D)  
2115  
Torrónen (A)  
2037  
Tribelhorn (R)  
2082  
Tzanetakis (N)  
2151  
Tziboula (A)  
2145  
Uauy-Dagach (R)  
2197  
Ueno-Mohri (T)  
2043  
Unnikrishnan (KR)  
2063  
Upadhyay (KG)  
2152 2153  
Urzendowski (IR)

2022  
Vafopoulou-Mastrogiannaki (A)  
2151  
Vaidehi (MP)  
2129 2177  
Valdivia (R)  
2101  
Valenzuela (A)  
2197  
Valles (C)  
2101  
Van Der Poel (AFB)  
2090  
van Rheeën (HA)  
2091  
Varalakshmi Rao  
2177  
Varoquaux (P)  
2049  
Vedamuthu (ER)  
2155  
Velez (OD)  
2214  
Verbruggen (MA)  
2087  
Vercellotti (JR)  
2210  
Verma (P)  
2095  
Vijaya Kumar (GV)  
2207  
Voragen (AGJ)  
2087  
Walker (R)  
2215

Wang (C)  
2173  
Widmer (WW)  
2191  
Willemot (C)  
2114  
Wolfe (FH)  
2142  
Xiong (YL)  
2141  
Xu (A)  
2125  
Xu (P)  
2035  
Yamanaka (S)  
2041 2042  
Yamani (MI)  
2051  
Yang (H-C)  
2066  
Yen (LC)  
2162  
Yonei (H)  
2193  
Yu-Ling Kuo  
2209  
Zbikowska (A)  
2142  
Zhang (Q)  
2026  
Zhang (SQ)  
2194  
Zhou (H-M)  
2134



# SUBJECT INDEX

- Acetobacter aceti**  
cellulose production,  
fermentation process & Aceto.  
aceti for 2041  
cellulose, Aceto. aceti &  
processing of gelatinous 2042
- Acidulants**  
acidulants choice in food  
processing 2054
- Additives**  
coconut oil, additives &  
liquid-solid transformation in  
2198
- Adulteration**  
citrus juices, adulteration  
detn. of 2191
- Aeromonas**  
aquatic foods,  
xylose-lysine-desoxycholate/  
/ampicillin-dextrin agar &  
Aeromonas isolation from 2171
- Aeromonas hydrophila**  
salmon, Aer. hydrophila growth in  
2175
- Aflatoxins**  
Aspergillus flavus, aflatoxin  
production control in modified  
atm. packed 2046
- Agars**  
Aeromonas isolation from aquatic  
foods &  
xylose-lysine-desoxycholate/  
/ampicillin-dextrin agar 2171
- Alcoholic beverages**  
L-ascorbic/D-ascorbic acid HPLC  
detn. in alcoholic beverages 2181
- Algae**  
blue green algae, amaranth  
absorption in 2043
- Almonds**  
green almonds, characteristics  
of 2096
- Amaranth**  
blue green algae, amaranth  
absorption in 2043
- Amino acids**  
groundnut, amino acid profiles  
of Inca 2101  
wheat glutenin, Mr subunits  
characterization/quantification/  
/amino acid analysis of 2071
- Amylases**  
corn,  $\alpha$ -amylase synthesis  
in 2079  
inhibition of rye/barley  
 $\alpha$ -amylase inhibitor 2037  
legume seeds, amylase inhibitors  
inactivation in germinating 2117  
sorghum, cooking/UV radiation &  
 $\alpha$ -amylase inhibitor  
activity in 2083
- Amylopectin**  
cross-linking reagents,  
amylopectin susceptibility to  
2125  
starch granules, amylopectin  
location in 2125
- Amylose**  
cross-linking reagents, amylos  
susceptibility to 2125  
starch granules, amylose location  
in 2125
- Animals**  
transgenic animals role in food  
production 2052
- Apples**  
ethylene & softening of apples  
2119  
fermented cider production from  
Kashmiri apples 2190  
slices, structure/firmness  
scanning electron microscopy of  
papain treated apple 2118
- Aquatic foods**  
xylose-lysine-desoxycholate/  
/ampicillin-dextrin agar &  
Aeromonas isolation from aquatic  
foods 2171
- Ascorbic acid**  
alcoholic beverages,  
L-ascorbic/D-ascorbic acid HPLC  
detn. in 2181
- Aspergillus flavus**  
packaging & growth/aflatoxin  
production control in Asp.  
flavus 2046
- Aspergillus sydowi**  
sucrose, Asp. sydowi synthesized  
polyfructan characteristics from  
2127
- Bacteria**  
Staphylococcus aureus/Salmonella  
enteritidis/Listeria  
monocytogenes detection by  
lectin-magnetic separation 2040  
differential equation to model  
bacterial growth 2039
- Bacteriocins**  
food applications & bacteriocins  
2038
- Baked products**  
iron-enriched baked products &  
body wts/haemoglobin levels in  
anaemic/normal subjects 2129
- Baking**  
Mozzarella cheese, whey acidity  
& baking characteristics of 2153  
cookie flour, wire-cut  
formulation & baking quality of  
2139  
wheat, disease & baking  
properties of 2069
- Bambara groundnut**  
Voandzela subterranea  
groundnut/milk,  
germination/fermentation &  
nutritional quality of 2097
- Bananas**  
papads,  
preparation/evaluation/storage  
of unripe banana based 2202
- Barley**  
cvs., starch  
swelling/gelatinization of  
barley 2057  
inhibition of barley  
 $\alpha$ -amylase 2037  
starch swelling/gelatinization of  
waxy hector barleys 2058  
wheat starch gelatinization &  
polydextrose/hydrolysed barley  
 $\beta$ -glucan 2076
- Barleys**  
 $\beta$ -D-glucans, near-infrared  
spectroscopy  
characterization/estimation of  
barleys 2059 2060
- Beef**  
heating & warmed-over flavour in  
stored beef 2161  
packaging-modified atm. &  
shelf-life extension of beef 2160
- Ber**  
wines, processing/preparation of  
ber 2185
- Beverages**  
citric acid demand by beverage  
industries 2030  
lime ginger cocktail,  
preparation/storage of 2186  
yeasts, beverage  
fermentation/spoilage by 2050
- Biotechnology**  
vegetables, biotechnological  
preservation of 2053
- Borassus aethiopum**  
Palmyrah palm 2090
- Bran**  
kernel breakage during rice bran  
removal operation 2065

- Bread**  
 colour/flour tristimulus  
 assessment of bread crumbs 2134  
 flour quality & frozen dough for  
 bread production 2137
- Breadmaking**  
 lipids-flour protein relationship  
 & breadmaking quality 2135  
 salts & flour breadmaking  
 properties 2136  
 wheat sprouted, bread from 2133
- Buffalo milk**  
 Fe fortified buffalo milk, flavour  
 of 2144  
 Mozzarella cheese, process  
 standardization & homogenized  
 buffalo milk for manufacture of  
 2152  
 osmosis-reverse application for  
 buffalo milk concn. 2143
- Burfi**  
 technology of burfi 2154
- Cajanus cajan**  
 see Pigeonpea
- Cakes**  
 signal detection ranking analysis  
 for commercial/health modified  
 cakes 2138
- Calcium**  
 milk, Ca & lipopolysaccharide  
 endotoxins in liquid 2146
- Callosobruchus maculatus**  
 host seed species & growth of *C.*  
*maculatus* larva 2212
- Cane sugar juices**  
 evaporators-cane sugar juice  
 cleaning time in sugar mills 2126
- Carbohydrates**  
 dairy products, carbohydrates  
 identification  
 immunolocalization techniques in  
 2140
- Carcinogens**  
 spices, anticarcinogenic activity  
 of 2200
- Carrot**  
*Staphylococcus carnosus* & nitrate  
 reduction in carrot juices 2107
- Carrot juices**  
*Staphylococcus carnosus* & nitrate  
 reduction in carrot juices 2107
- Carthamine**  
 saffron florets, precarthamine  
 extraction from 2055
- Casein**  
 peptides  
 isolation/structural/sensorial  
 analysis from  $\beta$ -casein 2157  
 rennin proteolytic action on casein  
 2142
- water content/sugars & glass  
 transition of casein 2156
- Cassava**  
 detoxification of Tanzanian  
 cassava foods 2108
- Cellulose**  
*Acetobacter aceti* & fermentation  
 process for cellulose production  
 2041  
*Acetobacter aceti* & processing of  
 gelatinous cellulose 2042  
 electron paramagnetic resonance  
 of  $\gamma$ -irradiated cellulose  
 2031
- Cereals**  
 weaning foods, phytic  
 acid/saponins/polyphenols in  
 cereals based 2056
- Cheese**  
 fatty acid composition of  
 cows/ewes/goats milk cheese 2150  
 lactic starter &  
 microbiological/chemical/sensory  
 characteristics of feta cheese  
 2151
- Chemical properties**  
 feta cheese, lactic starter &  
 chemical characteristics of 2151  
 hoki, chemical changes in ice  
 stored 2174
- Chemicals**  
 human exposure to chemicals 2215
- Chenopodium quinoa**  
 see Quinoa
- Chicken**  
 radiation detection GC in chicken  
 meat 2167
- Chickpeas**  
 improvement of chickpeas 2091  
 infant foods, nutritional quality  
 of malted/popped/roller dried  
 chickpea based 2178
- Cholesterol**  
 rice bran & serum cholesterol 2067
- Cider**  
 apples, fermented cider  
 production from Kashmiri 2190
- Citral**  
 nasal/organ/retronasal perception  
 of citral 2209
- Citric acid**  
 Fe availability & citric acid  
 role in model system 2213  
 citric acid demand by  
 food/beverage industries 2030
- Citrus juices**  
 adulteration detection in citrus  
 juices
- Coating**  
 lime fruits, skin coatings &  
 shelf-life of 2121
- Cocktail**  
 lime ginger cocktail,  
 preparation/storage of 2186
- Coconut oil**  
 additives & liquid-solid  
 transformation in coconut oil  
 2198
- Coconut water**  
 nutrient content changes in  
 coconut water & root infected  
 coconut 2098
- Cod**  
*Listeria monocytogenes* & spoilage  
 of lysozyme/EDTA treated cod 2173
- Colour**  
 measurement of food colours 2029  
 turkey meat, exudative occurrence  
 & colour measurement in 2169
- Contamination**  
 food contamination, International  
 Symposium/workshop on 2215
- Cookies**  
 wire-cut formulation & baking  
 quality of cookie flour 2139
- Cooking**  
 sorghum, cooking &  
 $\alpha$ -amylase inhibitors  
 activity in 2083
- Corn**  
 $\alpha$ -amylase synthesis in  
 germinating corn 2079  
 edible by-products from  
 high-lysine fractionated corn  
 2078  
 extruded corn-based products,  
 starch gelatinization & physical  
 properties of 2074  
 ogl production, sieved/unsieved  
 maize mash for 2081
- Corn starch**  
 paste, structure of corn starch  
 2080
- Cottonseed**  
 biochemical studies of cottonseed  
 based Nigerian soup Owoh 2099
- Cowpeas**  
 water uptake NMR assessment in  
 cowpea seeds 2092
- Cows milk**  
 cheese, fatty acid composition of  
 cows milk 2150
- Cucurmin**  
 turmeric, soil/plant  
 characteristics & cucurmin  
 content of 2207
- Dairies**  
 gels, viscoelastic properties of  
 dairy 2141



- Dairy products**  
 proteins/carbohydrates  
 identification  
 immunolocalization techniques in  
 dairy products 2140  
 rennin effect on casein in dairy  
 products 2142
- Detoxification**  
 cassava foods, detoxification of  
 Tanzanian 2108
- Diet**  
 toxins/diet interactions 2215
- Dough**  
 flour quality & frozen dough for  
 bread production 2137  
 viscoelasticity of zein-starch  
 dough 2131  
 yeast & rheological changes in  
 frozen dough 2132
- Dryers**  
 grain dryer controls 2027  
 logic control for crossflow grain  
 dryers 2026
- Drying**  
 fruit/vegetable processing,  
 osmotic dehydration in 2115
- Egg powder**  
 Salmonella inactivation &  
 physicochemical/sensory analyses  
 on egg powder 2170
- Electrophoresis**  
 glutenin structure,  
 electrophoretic based 2077
- Endives**  
 microorganisms in ready-to-use  
 processing of endives leaves 2112
- Enzymes**  
 rainbow trout, ice  
 storage/freezing & enzyme  
 leakage in 2176
- Escherichia coli**  
 temp./pH/NaCl & growth of *E. coli*  
 2044
- Essential oils**  
 chemistry/analysis/structure of  
 essential oils 2203  
 microbial production of essential  
 oils 2204
- Ethylene**  
 apples, ethylene & softening of  
 2119
- Evaporators**  
 sugar mills, cane sugar juice  
 evaporators cleaning time in 2126
- Ewes milk**  
 cheese, fatty acid composition of  
 ewes milk 2150
- Extrusion**  
 food extrusion technology 2019  
 peaflour, extrusion cooking
- Intensity infrared spectroscopy  
 of 2094
- protein quality of extruded foods  
 based on  
 wheat/sorghum/horsegram/  
 /sunflower seed cake 2177
- Farinograph**  
 glutenin structure, farinograph  
 based 2077
- Fats**  
 infant foods, fat encapsulation &  
 milk proteins effect on 2179  
 polymeric packaging material  
 additives migration into fats  
 2023
- Fatty acids**  
 fatty acid composition of  
 cows/ewes/goats milk cheese 2150  
 marine oils,  $\omega$ -3-fatty acid  
 in 2197  
 groundnut, fatty acid profiles of  
 Inca 2101  
 rice, sheller-paddy & fatty acid  
 changes in stored brown 2063  
 UHT milk, microorganism & fatty  
 acids in stored 2147
- Fermentation**  
 Lactobacillus, fermentation  
 properties of 2061  
 bambara groundnut/milk,  
 fermentation & nutritional  
 quality of 2097  
 yeasts, foods/beverages  
 fermentation by 2050
- Fish products**  
 nitrite detn. in smoked fish  
 products 2172
- Flakes**  
 sorghum, ready-to-eat flakes from  
 2130
- Flavour**  
 beef, heating & warmed-over  
 flavour in stored 2161  
 chemistry/analysis/structure of  
 flavours 2203  
 Fe fortified buffalo milk flavour  
 2144  
 microbial production of flavours  
 2204
- Flour**  
 bread crumbs, flour tristimulus  
 assessment of 2134  
 bread, flour quality & frozen  
 dough for 2137  
 cookie flour, wire-cut  
 formulation & baking quality of  
 2139
- Folate**  
 dried legumes, folate retention  
 in 2088
- Folic acid**  
 vegetables/fruits, folic acid  
 detn. HPLC in 2110
- Formulations**  
 random-centroid optimized food  
 formulation 2017
- Freezing**  
 rainbow trout, ice  
 storage/freezing & enzyme  
 leakage in 2176
- Fruit juices**  
 automatic analysis of fruit  
 juices 2187  
 particle-free clear fruit juices  
 2188
- Fruits**  
 controlled atm. fruit  
 preservation 2116  
 folic acid detn. HPLC in fruits  
 2110
- Fungicides**  
 lime fruits, fungicides &  
 shelf-life of 2120
- Gas chromatography**  
 chicken meat, radiation detection,  
 GC in 2167
- Gelatinization**  
 barley cvs, starch  
 gelatinization in 2057  
 barley, starch gelatinization in  
 waxy hector 2058
- Gels**  
 viscoelastic properties of dairy  
 gels 2141
- Ginger**  
 preparation/storage of lime  
 ginger cocktail 2186
- Glucans**  
 near-infrared spectroscopy  
 characterization/estimation of  
 barley  $\beta$ -D-glucans 2059 2060
- Glucose**  
 water mobility  $17^{\circ}$  NMR in  
 glucose 2128
- Glutenin**  
 Mr subunits  
 characterization/quantification/  
 /amino acid analysis of wheat  
 glutenin 2071  
 farinograph/electrophoretic &  
 glutenin structure 2077
- Goats milk**  
 cheese, fatty acid composition of  
 goats milk based 2150
- Grains**  
 grain dryer controls 2027  
 logic control for crossflow grain  
 dryer 2026
- Green gram**  
 weaning foods, phytic

- acid/saponins/polyphenols green gram based 2056
- Groundnuts**  
*Plukenetia volubilis*, amino acid/fatty acid profiles of Inca peanut 2101  
 database on groundnut aflatoxin 2102  
 storage temp./moisture content & lipid peroxidation in groundnuts 2100
- HPLC**  
 alcoholic beverages, L-ascorbic/D-ascorbic acid HPLC detn. in 2181  
 vegetables/fruits, folic acid detn. HPLC of 2110  
 wheat proteins, reversed-phase HPLC column analysis of 2072
- Ham**  
*Listeria monocytogenes*/*Lactococcus lactis* inhibition in Italian raw ham 2163
- Heat**  
 milk, starch & heat stability of 2145  
 oats, heat & lipase activity in 2062
- Heat transfer**  
 surface heat transfer coefficient & food particles heating in CNC sol. 2024
- Heating**  
 beef, heating & warmed-over flavour in stored 2161
- Hoki**  
 sensory/microbiological/chemical changes in ice stored hoki 2174
- Horsegram**  
 extruded foods, protein quality of horsegram based 2177
- Hypocholesterolemic agent**  
 mushrooms, hypocholesterolemic effect of 2048
- Hypolipidemic agent**  
 mushrooms, hypolipidemic effect of 2048
- Image analysis**  
 sausage slices, visual aspect measurement image analysis of dry 2165
- Immunolocalization**  
 dairy products, proteins/carbohydrates identification immunolocalization techniques in 2140
- Indigofera enyalphylla**  
 lipid composition of Central Indian *Indigofera enyalphylla* seeds 2195
- Industries**  
 citric acid demand by food/beverage industries 2030
- Infant foods**  
 fat encapsulation & milk proteins effect on spray-dried infant formula 2179  
 nutritional quality of malted/popped/roller dried wheat/chickpea based infant foods 2178
- Infestation**  
 rice, insect infestation in stored brown 2063
- Insects**  
 mushrooms, insect pests damage to North Eastern Indian white button 2047
- Iron**  
 citric acid & Fe availability in model system 2213
- Irradiated foods**  
 import control & thermoluminescence of irradiated foods 2032
- Isotherms**  
 semi-empirical model assessment for sigmoid moisture sorption isotherms 2025
- Juices**  
 palmyrah palm juice, characteristics of 2090
- Lactic acid**  
 feta cheese, lactic acid & microbiological/chemical/sensory characteristics of 2151
- Lactic acid bacteria**  
 soybean, lactic acid bacterial fermentation & trypsin inhibitor activity in 2104  
 wines, lactic acid bacteria characterization in 2184
- Lactobacillus**  
 fermentation properties intestinal strains of *Lactobacillus* 2061
- Lactococcus**  
 milk acidification & lactococci 2148
- Lactococcus lactis**  
 ham, *L. lactis* inhibition in Italian raw 2163
- Leaf protein concentrates**  
 research in leaf protein concentrates 2111
- Lectins**  
 legume seeds, lectin inactivation in germinating 2117
- Legumes**  
 folate retention in dried legumes 2088  
 trypsin/tannins/lectins/amylase inhibitors inactivation in germinating legume seeds 2117
- Lignin**  
 polysaccharide analysis & recovery of lignin 2123
- Lignocellulose**  
 electron paramagnetic resonance of  $\gamma$ -irradiated lignocellulose 2031
- Lime**  
 fungicides/2,4- dip treatments & shelf-life of lime fruits 2120  
 cocktail, preparation/storage of lime ginger 2186  
 skin coatings/2,4-D/prepackaging & shelf-life of acid lime fruits 2121
- Lipase**  
 oats, distribution/pH/heat & lipase activity in 2062
- Lipids**  
*Withania somnifera*/*Phoenix sylvestris*/*Indigofera enyalphylla*, seeds lipid composition in Central Indian 2195  
 breadmaking quality & lipids-flour protein relationship 2135
- Liquid foods**  
 microbiologically safe pasteurization of liquid foods 2018
- Listeria monocytogenes**  
 cod, *L. monocytogenes* & spoilage of 2173  
 ham, *L. monocytogenes* inhibition in Italian raw 2163  
 lectin-magnetic separation & detection of *L. monocytogenes* 2040  
 pork, heat & destruction of *L. monocytogenes* in kappa-carrageenan/sodium lactate/calcium containing ground pork 2162.  
 salmon, *L. monocytogenes* growth in 2175
- Lysine**  
 corn, edible by-products from high-lysine fractionated 2078
- Maltose**  
 water mobility  $17^{\circ}$  NMR in maltose 2128
- Maltotriose**  
 water mobility  $17^{\circ}$  NMR in



- Maltotriose** 2128
- Mangoes**  
thermal process for mango pulp 2122
- Meat**  
offals-edible from meat animals 2159  
packaging/storage & warmed over flavour of sliced/cooked meat 2158
- Mechanical**  
packaging materials, dynamic mechanical characterization of 2022
- Microbiocide**  
orange juice, microbicide & hydrostatic pressure on 2193
- Microorganisms**  
endives leaves, bacterial quality of ready-to-use processing of 2112  
essential oils/flavours microbial production of 2204  
feta cheese, lactic starter & microbiological characteristics of 2151  
hoki, microbiological changes in ice stored 2174  
UHT milk, microorganisms & fatty acids of stored 2147  
vegetables, microflora in refrigerated/abuse temp. stored 2109
- Microscopy**  
packaging materials, microscopic characterization of 2022
- Microwaves**  
drying-microwave oven moisture content detn. in foods 2034
- Milk**  
calcium & lipopolysaccharide endotoxins in liquid milk 2146  
microorganisms & fatty acids/organoleptic quality of stored UHT milk 2147  
penicillin/lactococci & acidification of milk 2148  
starch & heat stability of milk 2145  
Yersinia recovery from milk 2045
- Milk products**  
starter cultures application in fermented milk products 2149
- Milk proteins**  
infant foods, fat encapsulation & milk proteins effect on 2179  
water content/sugars & glass transition of casein 2156
- Millets**  
utilization of millets 2086
- Milling**  
pigeonpea, enzymatic pretreatment & milling interaction of 2095  
wheat, disease & milling properties of 2069
- Moisture**  
fruits/vegetables processing, drying & moisture content detn. in 2115  
groundnuts, storage temp. & lipid peroxidation in 2100  
soybeans, grain moisture & spatial dimensions of 2103
- Molecular biology**  
advances in molecular biology 2036
- Mozzarella cheese**  
homogenized buffalo milk & process standardization for Mozzarella cheese manufacture 2152  
whey acidity & baking/rheological/sensory characteristics of buffalo milk Mozzarella cheese manufacture 2153
- Mucuna monosperma**  
see Pulses
- Mushrooms**  
Pleurotus florida, hypocholesterolemic/hypolipidemic effect of 2048  
insect pests damage to North Eastern Indian white button mushrooms 2047  
modified atm. packaging of mushrooms 2049
- Mustard oil**  
interesterified mustard oil, nutritional value of 2199
- Mycotoxins**  
International symposium/workshop on mycotoxins 2215
- NMR**  
wheat starch-sucrose-water interactions, temp. increase NMR in 2073
- Nitrates**  
carrot juice, Staphylococcus carnosus & nitrate reduction in 2107
- Nitrites**  
fish products, nitrites detn. in 2172
- Noodle**  
wheat, noodle quality viscoanalyser testing of 2070
- Nutrients**  
coconut water, root infected coconuts & nutrient content changes in 2098
- Nutrition**  
mustard oil, nutritional value of interesterified 2199
- Nutritional evaluation**  
soybeans, nutritional/anti-nutritional factors of 2105
- Nutritional values**  
bambara groundnut/milk, nutritional quality of 2097  
infant foods, nutritional quality of malted/popped/roller dried wheat/chickpea based 2178  
quinoa seed protein, nutritional quality of 2064  
yoghurts, nutritional values of 2155
- Oats**  
distribution/pH/heat & lipase activity in oats 2062
- Offals**  
meat animals, offals-edible from 2159
- Ogi**  
sieved/unsieved malze mash for ogi production 2081
- Oils**  
flexible packaging materials standardization for edible oils 2196  
omega-3-fatty acid in marines oils 2197
- Orange concentrates**  
difference testing between orange juices from orange concentrates 2192
- Orange juices**  
difference testing between orange juices from orange concentrates 2192  
microbiocidal & hydrostatic pressure on Satsuma orange juices 2193
- Orange oils**  
 $^{13}\text{C}/^{12}\text{C}$  isotope ratio analytical/technological influence in orange oils 2205
- Osmosis**  
buffalo milk concn. & reverse osmosis 2143  
tea juice concn., reverse osmosis for 2194
- Packaging**  
Aspergillus flavus, packaging modified atm. & growth of 2046  
beef, packaging-modified atm. & shelf-life extension of 2160  
lime fruits, prepackaging & shelf-life of 2121  
meat, packaging & warmed over flavour of sliced/cooked 2158

- trends 2021
- Packaging materials**  
edible oils/vanaspathi, flexible packaging materials  
standardization for 2196  
microscopic/spectrophotometric/thermal/dynamic mechanical characterization of food packaging materials 2022  
polymeric packaging material additives migration into fats 2023
- Packaging modified atmosphere**  
mushroom, modified atm. packaging of 2049
- Palmyrah palm**  
Borassus aethiopum, juice characteristics of 2090
- Panicum miliaceum**  
see Proso millets
- Papads**  
preparation/evaluation/storage of rice flake flour/banana based papads 2202
- Papain**  
apple slices, structure/firmness scanning electron microscopy of papain treated 2118
- Pastes**  
corn starch paste, structure of 2080
- Pasteurization**  
liquid foods, microorganisms & pasteurization of 2018
- Peas**  
extrusion cooking intensity infrared spectroscopy of peaflour 2094
- Pectins**  
plant cell walls/foods, pectins in 2028
- Peda**  
technology of peda 2154
- Perlite**  
wine processing, perlite trace elements release during 2183
- Pests**  
grain storage, pest management in 2212
- Phoenix sylvestris**  
lipid composition of Central Indian Phoenix sylvestris seeds 2195
- Physical properties**  
egg powder, physical properties of 2170
- Phytates**  
foods, phytate analysis in 2035
- Phytic acid**  
weaning foods, phytic acid in green gram/cereal based 2056
- Pigeonpea**  
Cajanus cajan, enzymatic pretreatment & milling interaction of 2095
- Plants**  
uranium estimation in edible plants 2033
- Pleurotus florida**  
see Mushrooms
- Plukenetia volubilis**  
see Groundnuts
- Polyfructar.**  
sucrose, Asp. sydowi synthesized polyfructan characteristics from 2127
- Polyphenols**  
weaning foods, polyphenols in green gram/cereal based 2056
- Polysaccharides**  
barley polysaccharides near-infrared spectroscopy characterization/estimation of 2059 2060  
lignin recovery & polysaccharide analysis 2123  
sorghums, polysaccharides content/composition in 2085
- Pork**  
heat & destruction of L. monocytogenes in kappa-carrageenan/sodium lactate/calcium containing ground pork 2162
- Poultry**  
waste utilisation in poultry processing plant 2166
- Preservation**  
fruits, controlled atm. preservation of 2116  
processed foods, preservation/supply of fresh 2020
- Processing**  
acidulants choice in food processing 2054  
poultry processing plant waste utilisation 2166
- Proso millets**  
Panicum miliaceum, puffing quality of 2082
- Proteins**  
blood proteins incorporation into sausages 2164  
breadmaking quality & flour protein 2135  
extruded foods, protein quality of wheat/sorghum/horsegram/sunflower seed cake based on 2177
- quinoa seed protein, nutritional quality of 2064
- sorghum, kafirin isolation/immunochemical characterization from 2084
- Proteins cereal**  
reversed-phase HPLC column analysis of wheat proteins 2072
- Proteins milk**  
dairy products, protein identification immunolocalization techniques in 2140
- Proteins vegetables**  
food emulsion stabilization by vegetable proteins 2214  
leaf protein concentrates, research in 2111
- Puffing**  
Proso millets, puffing quality of 2082
- Pulses**  
advances in pulses research in Bangladesh 2089  
Mucuna monosperma, biochemical composition/nutritional potential of tribal 2093
- Quail**  
quality of battered quail 2168
- Quality**  
quality challenge for India 2016  
turmeric Lakadong cvs., nitrogen/potassium & quality of 2208  
turmeric rhizomes, quality changes during storage of 2206  
wheat cvs., quality evaluation of Durum/Landrace 2068  
wheat, disease & milling/rheological/baking properties of 2069  
wheat, quality/characterization of red 2075
- Quinoa**  
Chemopodium quinoa seed protein, nutritional quality of 2064
- Radiation**  
chicken meat, radiation detection GC in 2167  
sorghum, UV radiation &  $\alpha$ -amylase inhibitor activity in 2083
- Rainbow trouts**  
storage cold enzyme leakage in rainbow trout 2176
- Rennin**  
dairy products, rennin proteolytic action on casein in 2142



- Rheological properties**  
doughs, yeast & rheological changes in frozen 2132  
wheat, disease & rheological properties of 2069
- Rheology**  
Mozzarella cheese, rheological characteristics of 2153
- Rice**  
kernel breakage during rice bran removal operation 2065  
sheller-paddy & free fatty acids/insect infestation changes in stored brown rice 2063  
thermal processing of rice 2066
- Rice bran**  
cholesterol serum & rice bran 2067
- Rice flakes**  
papads, preparation/evaluation/storage of rice flakes flour based 2202
- Rye**  
inhibition of rye  $\alpha$ -amylase 2037
- Safety**  
liquid foods, microorganisms & pasteurization of 2018
- Saffron**  
precatharine extraction from dyer's saffron florets 2055
- Salmon**  
bacterial growth in salmon 2175
- Salmonella**  
egg powder, *Salmonella* inactivation properties of 2170
- Salmonella enteritidis**  
lectin-magnetic separation & detection of *Sal.* enteritidis 2040
- Saltiness**  
temp. - sample/rinse & discrimination of saltiness 2189
- Salts**  
breadmaking properties of flour, salts & flour 2136
- Saponins**  
weaning foods, saponins in green gram/cereal based 2056
- Sausages**  
blood proteins incorporation into sausages 2164  
dry sausage slices, visual aspect measurement image analysis of 2165
- Scanning electron microscopy**  
apple slices, structure/firmness scanning electron microscopy of papain treated 2118
- Seafoods**  
toxins detection in seafoods 2215
- Sensory analysis**  
bitter taste sensitivity & bitter substance consumption relationships 2211  
cakes, signal detection ranking analysis for commercial/health modified 2138  
 $\beta$ -casein, peptides sensory analysis in 2157  
egg powder, sensory analysis of 2170  
noise reduction in descriptive sensory data 2210
- Sensory properties**  
feta cheese, lactic starter & sensory characters of 2151  
hoki, sensory properties of ice stored 2174  
Mozzarella cheese, sensory characteristics of 2153
- Shelf-life**  
beef, packaging-modified atm. & shelf-life extension of 2160  
groundnuts, storage temp./moisture content & shelf-life of unblanched salted roasted 2100  
lime fruits, fungicides/2,4-dip treatments & shelf-life of 2120  
lime fruits, skin coatings/2,4-D/prepackaging & shelf-life of 2121
- Smoked foods**  
fish products, nitrites detn. in smoked 2172
- Snacks**  
sorghum, ready-to-eat snack products from 2130
- Sodium caseinate**  
water content/sugar & glass transition of sodium caseinate 2156
- Sodium chloride**  
*Escherichia coli*, NaCl & growth of 2044
- Sorghum**  
cell wall material, isolation/characterization of sorghum water-unextractable 2087  
cooking/UV radiation &  $\alpha$ -amylase inhibitor activity in sorghum 2083  
kafirins isolation & immunochemical characterization from sorghum 2084  
polysaccharides content/composition in sorghum 2085  
protein quality of extruded cooked foods based on sorghum 2177  
ready-to-eat flakes/snack products from sorghum 2130  
utilization of sorghum 2086
- Sorghum bicolor**  
see Sorghum
- Soups**  
owoh, biochemical studies of cottonseed based Nigerian soup 2099
- Soybeans**  
grain moisture & spatial dimensions of soybeans 2103  
lactic acid fermentation & trypsin inhibitor activity in soybeans 2104  
nutritional/anti-nutritional factors of soybean genotypes 2105
- Spectrophotometry**  
packaging materials, spectrophotometric characterization of 2022
- Spectroscopy**  
pea flour, extrusion cooking intensity infrared spectroscopy of 2094
- Spices**  
antitumor/anticarcinogenic activity of spices 2200  
production of spices 2201
- Spoilage**  
yeasts, food/beverage spoilage by 2050
- Staphylococcus aureus**  
lectin-magnetic separation & detection of *Staph. aureus* 2040
- Staphylococcus carnosus**  
carrot juice, *Staphylococcus carnosus* & nitrate reduction in 2107
- Starch**  
amylose/amylopectin in starch granules 2125  
barley cvs., starch swelling/gelatinization of 2057  
estimation of starch 2124  
milk, starch & heat stability of 2145  
viscoelasticity of zein-starch doughs 2131  
wheat/corn based extruded products, starch gelatinization & physical properties of 2074
- Starter cultures**  
fermented milk products, starter cultures application in 2149
- Storage**  
grain storage, pest management in 2212

- groundnuts, storage temp. & lipid peroxidation in 2100
- lime ginger cocktail, storage of 2186
- meat, storage & warmed over flavour of sliced/cooked 2158
- rice, fatty acid & insect infestation in stored brown 2063
- turmeric rhizomes, quality changes during storage of 2206
- weaning foods, storage stability of 2180
- Storage cold**
- rainbow trout, ice storage/freezing & enzyme leakage in 2176
- Storage meat**
- beef, heating & warmed-over flavour in stored 2161
- Storage milk**
- UHT milk, microorganism & fatty acids/organoleptic quality of stored 2147
- Sucrose**
- Aspergillus sydowii* synthesized polyfructan characteristics from sucrose 2127
- water mobility  $17^{\circ}\text{O}$  NMR in sucrose 2128
- wheat starch-sucrose-water interactions, temp. increase NMR in 2073
- Sugars**
- water mobility  $17^{\circ}\text{O}$  NMR in glucose/maltose/maltotriose/sucrose 2128
- Sunflower**
- protein quality of extruded cooked foods based on sunflower seeds 2177
- water vapour desorption: measurement in sunflower seeds 2106
- Sweetness**
- temp. - sample/rinse & discrimination of sweetness 2189
- Swelling**
- barley cvs., starch swelling in 2057
- barley cvs, starch swelling in waxy hector 2058
- Tandoori**
- quality of quail tandoori 2168
- Tannins**
- legume seeds, tannins inactivation in germinating 2117
- Tea**
- osmosis-reverse transport & module analysis for tea juice concn. 2194
- Technology**
- burfi/peda, technology of 2154
- Thermal**
- packaging materials, thermal characterization of 2022
- Thermal process**
- mango pulp, thermal process for 2122
- rice, thermal processing of 2066
- tomato juice, thermal processing of 2113
- Thermoluminescence**
- irradiated foods, import control & thermoluminescence of 2032
- Tomato juice**
- thermal processing of tomato juice 2113
- Tomatoes**
- chilling tolerance & internal atm. of tomatoes 2114
- Toxins**
- milk, Ca & lipopolysaccharide in liquid 2146
- Trypsin**
- legume seeds, trypsin inhibitors inactivation in germinating 2117
- Tumor**
- spices, antitumorogenic activity of 2200
- Turkeys**
- exudative occurrence colour measurement in turkey meat 2169
- Turmeric**
- Lakadong cvs., nitrogen/potassium & yield/quality of turmeric 2208
- rhizomes, quality of stored turmeric 2206
- soil/plant characters & curcumin content of turmeric 2207
- Uranium**
- plants, uranium estimation in edible 2033
- Vanaspathi**
- flexible packaging materials standardization for vanaspathi 2196
- Vanillin**
- nasal/organ/retronasal perception of vanillin 2209
- Vegetables**
- biotechnological preservation of vegetables 2053
- folic acid detn. HPLC in vegetables 2110
- microflora of stored fresh cut vegetables 2109
- osmotic dehydration in vegetable processing 2115
- Viscoanalyser**
- wheat, noodle quality viscoanalyser testing of 2070
- Viscoelastic properties**
- gels, viscoelastic properties of dairy 2141
- Viscoelasticity**
- zein-starch dough, viscoelasticity of 2131
- Voandzeia subterranea**
- see Bambara groundnut
- Weaning foods**
- green gram/cereals based weaning foods, phytic acid/saponins/polyphenols in 2058
- storage stability of weaning foods 2180
- Wheat**
- bread from sprouted wheat 2133
- disease & milling/rheological/baking properties of wheat 2069
- extruded wheat-based products, starch gelatinization & physical properties of 2074
- infant foods, nutritional quality of malted/popped/roller dried wheat based 2178
- noodle quality viscoanalyser testing of wheat 2070
- protein quality of extruded foods based on wheat 2177
- quality evaluation of Jordan Landrace/Durum cvs. wheat 2068
- quality/classification of hard red wheat 2075
- Wheat starch**
- polydextrose/hydrolyzed barley  $\beta$ -glucan & gelatinization of wheat starch 2076
- temp. increase NMR in wheat starch-sucrose-water interactions 2073
- Wheys**
- Mozzarella cheese, whey acidity & manufacture of 2153
- Whisky**
- cask charring & maturation of whisky 2182
- Wine**
- processing, perlite & trace elements release during wine 2183
- Wines**
- processing/preparation of berry wines 2185
- yeast/lactic acid bacterial characterization in rosy wines 2184
- Withania somnifera**
- lipid composition of Central Indian *Withania somnifera* seeds 2195



**Yeasts**

doughs, yeast & rheological  
changes in frozen 2132  
foods/beverages  
fermentation/spoilage by yeasts  
2050  
wines, yeast characterization in

ropy 2184

yoghurt whey medium for  
food-borne yeasts 2051

**Yersina**

food/milk, Yersina recovery from  
2045

**Yersinia enterocolitica**

salmon, *Y. enterocolitica* growth  
in 2175

**Yoghurts**

nutritional benefits of yoghurt  
2155

## **DIRECTORY OF INDIAN FOOD MACHINERY AND PACKAGING EQUIPMENT**

### **2nd Edition**

### **(1993)**

Central Food Technological Research Institute (CFTRI), Mysore, has now published the 2nd revised and enlarged edition of Directory of Indian Food Machinery and Packaging Equipment. It includes 912 alphabetically listed Machinery and equipment manufacturers, with their complete addresses. The second part of the Directory lists the manufacturers under different categories of equipment they manufacture. This 223-page Directory is priced at Rs.300/- plus Rs.40/- for packing and forwarding. Copies will be despatched after the receipt of the Demand Draft drawn in favour of Director, CFTRI, Mysore, and forwarded to Head, FOSTIS, CFTRI, Mysore - 570 013. Copies also available at our Regional Centres in Hyderabad (Phone No. 854128), Mangalore (Phone No. 24304), Lucknow (Phone No. 382516), Ludhiana (Phone No. 490568), Nagpur (Phone No. 534571), Bombay (Phone No. 6231599) and Liaison Office at Bangalore (Phone No 569931).

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<i>Food Patents</i>	200.00	70.00

Editor



## GENERAL

2216

Soharab. **ISO 9000 and food industry.** *Indian Food Packer* 47(5); 1993; 65-69

Food industry has its special requirements right from raw material - through processing and packaging and transport to the consumer points. While developing documented systems (manual, procedures, work instructions formats, etc) all such requirements should be taken into account. ISO 9000 series of standards should be adopted in the management system suited to the requirements of the industry to ensure quality of products. GS

2217

Selman (J). **New technologies for the food industry.** *Food Science and Technology Today* 6(4); 1992; 205-209

The interaction between processes preservation techniques and packaging in food industries; the new technologies developed in this area such as ohmic heating system, irradiation technology, ultra-high pressure technology, biopreservation, preservation using genetic engineering, modified atmospheric packaging, and hyper oxygen pasteurisation; and the legislative aspects are highlighted. GS

## FOOD PROCESSING

2218

Anvita Shaw, Purinima Mathur and Mehrotra (NN). **Food processing: a scenario.** *Indian Food Packer* 47(3); 1993; 5-15

Reviews the history of food processing industry in India, its scope and status of manufacturing food products, food processing sector targets, growth rate of manufactured food products, perspective of cereal, fruit and vegetable products, growth in production of food products from 1970 to 1990; growth of fruit and vegetable processing industry; and factors affecting the performance of food industry such

as quality, availability and compatibility of raw materials, selection of appropriate technology, relevance of the products and cost of production in relation to per capita income, quality of packaging materials, nutrition and safety standards and by-product utilization. GS

2219

Williams (AP), Blackburn (CDW) and Gibbs (PA). **Advances in predictive techniques to improve the safety and extend the shelf life of foods.** *Food Science and Technology Today* 6(3); 1992; 148-151

The introduction of predictive techniques to control safety and quality of foods through differential mathematical models has been emphasised. Such modelling techniques enable innovative products, alternatives to formulations of existing products ensuring safety to the consumer. The cost of prediction through such models is also economical. GS

## FOOD PACKAGING

2220

Worsfold (D) and Griffith (C). **Food safety of packed meals.** *Food Science and Technology Today* 6(2); 1992; 210-217

Highlights the dangers of advance preparation of food, storage at ambient temp. and inadequate cooling of packed meals of school children. The use of insulated bags with an inner pack for packing meals, pre-chilling of food, supply of guidelines for the preparation and storage of packed meals, use of classroom refrigerators and care in temp. control at all stages in the purchase, transport and preparation of food, are recommended to maintain food safety. GS

## FOOD ENGINEERING AND EQUIPMENT

2221

Schreier (PJR), Reid (DG) and Fryer (PJ). **Enhanced diffusion during the electrical heating of foods.** *International Journal of Food Science and Technology* 28(3); 1993; 249-260



The diffusion of a natural dye from a food into the surrounding liquid in both electrical and conventional cooking was studied and the differences between the two cooking processes were analysed. Electrical heating produced a greater dye efflux than conventional heating. Betanin effusion from beetroot was more during 50 Hz electrical heating than during conventional heating. GS

2222

Murao (S), Nomura (Y), Nagata (S), Iwamoto (T), Iwahara (M), Shin (T). **Development and evaluation of novel sterilizer with rotary vibrations.** *International Journal of Food Microbiology* 18(1); 1993; 63-70

Reports an exp. steam-air sterilizer with rotary vibrators, 'vitort' developed, and tested for promotion of heat transfer, effective sterilization and repression of amino carbonyl reaction. In the experiments to examine heat transfer, heat penetration factors sterilizer with vibration,  $j$  and  $f_h$  values, were 1.70 and 1.50, respectively. In the sterilization with vibration, no surviving cells were detected after 3 min, whereas 7 min were required for sterilization without vibration. The rate of amino carbonyl reaction was repressed by heat treatment with vibration. SRA

## ENERGY IN FOOD PROCESSING

Nil

## FOOD CHEMISTRY AND ANALYSIS

### Chemistry

2223

Debeaufort (F), Martin-Polo (M) and Voilley (A). **Polarity homogeneity and structure affect water vapour permeability of model edible films.** *Journal of Food Science* 58(2); 1993; 426-429, 434

A continuous gravimetric measurement method was perfected to determine with

accuracy the water vapour permeability of edible films. Two substances, methylcellulose and paraffin wax, with different physicochemical properties, were used as films. Factors affecting permeability included the polarity of film components, the homogeneity or dispersion of material in the film and the structure which depends on the distribution of paraffin wax in the composite films. The thickness and the Water Vapor Transmission Rate (WVTR) measurement methods resulted in different values for permeability. WVTR increased with hydrophilicity and heterogeneity. Modelling trials concerning water vapour transport indicated the major influence that structure had on permeability. Wax-laminated films had a very high barrier efficiency, comparable with that of synthetic films. AA

2224

Bassal (A), Vasseur (J) and Lebert (A). **Measurement of water activity above 100°C.** *Journal of Food Science* 58(2); 1993; 449-452

The method is based on equilibration of the sample with an atm. of pure water vapour at constant pressure.  $a_w$  is calculated from the sample temp. at equilibrium. A curve describing  $X = f(a_w)$  at constant water vapour pressure (isobar) was established for microcrystalline cellulose and potato starch, within the range 100-150°C. The precision of the method was evaluated and an empirical model, based on the GAB equation, was developed to fit experimental data. Detn. were specifically with isobars at 1 bar, but isobars at other pressures could be determined by modifying the system. AA

2225

Hsi-Mei Lai and Schmidt (SJ). **Mobility of water in various sugar-water systems as studied by oxygen-17 NMR.** *Food Chemistry* 46(1); 1993; 55-60

The mobility of water in lactose, sucrose, fructose sol. and their combinations was measured by proton decoupled oxygen-17 NMR transverse relaxation rates  $R_2$ ,  $s^{-1}$ . The behaviour of  $R_2$  as a function of concn. for the single sugar sol. was similar at low concn. but deviated at high concn. with sucrose and



fructose.  $R_2$  of sugar sol. concn. at low levels were not influenced by sugar type or combination ratio but by the total concn. of the sugar present. A mass balance approach could predict  $R_2$  only at low total sugar concn. SD

2226

Altamirano (RC), Drdak (M), Simon (P), Rajniakova (A), Karovicova (J), Preclik (L). **Thermal degradation of betanine in various alcohol model systems.** *Food Chemistry* 46(1); 1993; 73-75

Thermal degradation of betanine in the model systems water/glycerol, water/ethylene glycol and water/ethanol was studied at 60 - 86°C.  $a_w$  of 0.87 and pH adjusted to 5.0 were chosen. Water/ethanol system showed the lowest stability of betanine and the lowest activation energy due to nucleophilic attack on the structure  $>N^+ = CH-$  as the first step of betanine degradation. The study also confirmed that Guggenheim method is the most suitable for the treatment of experimental kinetic curves. SD

2227

Zlatanov (S) and Voutsas (AT). **Design and economics of a chemical plant for the production of glycidylalkylesters of phthalic acid.** *FAT Science Technology* 95(4); 1993; 155-158

A chemical plant for the production of glycidylalkylesters of phthalic acid from aliphatic alcohols, epichlorohydrine and phthalic acid anhydride, has been designed. The plant combines batch and continuous processes in a fairly simple design and facilitates recycling to lower the cost of raw materials. The economic evaluation of the unit reveals attractive potentials, which may be attributed to the fairly low cost of equipment and raw materials. AA

2228

Ledward (D). **Gelation.** *Food Science and Technology Today* 6(4); 1992; 236-241

Discusses gelation mechanism, concept of useful and non-useful junctions, effect of maturing conditions on gel strength, effect of

gelatin type, and summary of factors affecting gel strength. GS

2229

Velisek (J), Ledahudeova (K), Davidek (PJ) and Kubelka (V). **Chlorine-containing compounds derived from saccharides in protein hydrolysates. I. 5-Chloromethyl-2-furancarboxaldehyde.** *Lebensmittel-Wissenschaft und -Technologie* 26(1); 1993; 38-41

Volatile components of traditionally manufactured soybean meal hydrolysates, widely used as seasonings, were analysed by GC and GC/MS. 5-Chloromethyl-2-furancarboxaldehyde (CMFC) was newly identified as a constituent of these commodities, being present at a level of 1.0 to 1.8 mg/kg. Hydrolysates manufactured by new procedures contained no CMFC. This compound was stable in sol. simulating protein hydrolysates manufacture and storage. In hydrolysates of pH 8.5 it quickly decomposed. AA

#### Chemistry (Analytical)

2230

Papadopoulou (K) and Ames (JM). **Separation of the coloured reaction products formed in  $\beta$ -carotene and/or phenylalanine model systems.** *Food Chemistry* 46(1); 1993; 65-71

Model systems of  $\beta$ -carotene, phenylalanine and their mixture in liquid paraffin were heated at 210°C for 15 min. The absorbance of the mixture at 420 nm was about 15 and 20 times more than that of phenylalanine and  $\beta$ -carotene respectively. The methanol extractable components (MEC) of each system were 17.6, 76.4 and 14% respectively of the coloured components present. HPLC of  $\beta$ -carotene MEC revealed no major peaks but TLC only one coloured band. HPLC for the mixture and phenylalanine systems being complex showed 4 common peaks, two of which were larger in phenylalanine system. Further components were detected by subsequent HPLC of the TLC bands. SD



2231

Cerda (A), Forteza (R) and Cerda (V). **Determination of iodide in table salt by flow injection analysis using pyrocatechol violet.** *Food Chemistry* 46(1); 1993; 95-99

The spectrophotometric flow injection method developed based on catalytic effect of ion on the oxidation of pyrocatechol violet by potassium persulphate was successfully applied to table salt and could determine 0.5 - 5 mg/l iodine at a rate of 60 samples/h. SD

2232

Sastry (CSP), Gopala Rao (S) and Sastry (BS). **New spectrophotometric methods for the determination of di-t-butyl hydroquinone.** *Food Chemistry* 46(1); 1993; 101-103

Three spectrophotometric methods based on formation of coloured species with Fe (III)-2,4,6-tripyridyl-S-azine or triphenyl tetrazolium chloride or IO<sub>4</sub>/Mo (VI)/I/metol-sulphanilamide were developed and di-t-butyl hydroquinone in coconut, sunflower, groundnut and cotton seed oils was determined. SD

2233

Madl (RL). **Evolution of protein quality determination.** *Cereal Foods World* 38(8); 1993; 576-577

The article offers an overview of the evolution of the changes in the protein quality measurements, the rationale for the change and the calculation of the protein digestibility corrected amino acid score. CSA

## FOOD MICROBIOLOGY AND HYGIENE

### Fermentation

2234

Samah (OA), Puteh (MF), Selamat (J) and Alimon (H). **Fermentation products in cocoa beans inoculated with *Acetobacter xylinum*.** *ASEAN Food Journal* 8(1); 1993; 22-25

This paper illustrates the effect of *Acetobacter xylinum* on the fermentation of cocoa products and compares flavour characteristics with those of Ghanaian beans. Ripe beans of mixed sabah were processed by two methods (1) beans were left under a natural fermentation process as control and (2) the beans were inoculated with *A. xylinum* and left open to atm. allowing free access to natural microflora. The flavour assessment indicated that Ghanaian beans (pH 5.84) had a relatively higher chocolate flavour score compared to either inoculated (pH 5.02) or control beans (pH 5.23) towards the end of a 6 day fermentation period. Treated beans had higher levels of acetic acid. SRA

### Microorganisms

#### Bacteria

2235

Liao (C-C), Yousef(AE), Richter(ER) and Chism (CW). ***Pediococcus acidilactici* PO2 bacteriocin production in whey permeate and inhibition of *Listeria monocytogenes* in foods.** *Journal of Food Science* 58(2); 1993; 430-434

Growth of *Pediococcus acidilactici* PO2 and production of associated bacteriocin (pediocin PO2) were demonstrated in whey permeate (WP) supplemented with 0.5 - 4% yeast extract (YE). Initial pH 6.5 (without pH regulation during fermentation) was optimal for production of pediocin PO2 in WP containing 2% YE. A pediocin-rich dairy ingredient (PRDI) powder was made of the fermented WP and applied in heat-treated whole milk and pasteurized liquid whole egg. PRDI inhibited *L. monocytogenes* in milk. *L. monocytogenes* was inhibited by untreated liquid whole egg and PRDI appeared to contain a factor that offsets the inherent antilisterial action of the egg product. AA

2236

Sapru (V) and Labuza (TP). **Glassy state in bacterial spores predicted by polymer glass-transition theory.** *Journal of Food Science* 58(2); 1993; 445-448

Polymer glass-transition theory was used to gain information about a possible general



mechanism to explain the high heat resistance of bacterial spores. In a glassy state the configuration of vital macromolecules and supramolecular assemblies in the spore protoplast would change extremely slowly when heated. The temp. dependence for heat inactivation rates above the glass-transition temp. was shown to be free-vol. dependent and described by the kinetics commonly observed for glassy polymers. Glass-transition temp. for various spores, predicted by non-linear regression analysis of their heat inactivation rates at different temp., increased with increasing heat resistance as expected. AA

2237

Kim (WJ). **Bacteriocins of lactic acid bacteria: their potentials as food biopreservative.** *Food Reviews International* 9(2); 1993; 299-313

This review discusses the research conducted on bacteriocinogenic lactic acid bacteria isolated from a wide var. of foods and in some instances of animal origin - and the characteristics of bacteriocins. Emphasis is placed on their potentials for use as food preservative and on their physicochemical nature, antibacterial spectrum, and genetic behaviour. Aspects covered are, bacteriocins of pediococci, bacteriocins of lactobacilli (*Lactobacillus helveticus*, *Lact. acidophilus*, *Lact. plantarum*, *Lact. sake*, miscellaneous Lactobacilli bacteriocins), bacteriocins of cornobacterium, bacteriocins of leuconostocs, bacteriocins, of lactococci (nisin, diplococcin, lactostrepcin, lactococcin, miscellaneous lactococcal bacteriocins), and perspective on bacteriocin. 132 references. SRA

2238

Zuniga (M), Pardo (I) and Ferrer (S). **An improved medium for distinguishing between homofermentative and heterofermentative lactic acid bacteria.** *International Journal of Food Microbiology* 18(1); 1993; 37-42

This study evaluated HHD medium with lactic acid bacteria (LAB) isolated from musts and wines and found that several strains were unable to grow. Hence an alternative medium (M5) was tested to support the growth of wine

strains. Results indicated that M5 could be used as a general medium for distinguishing homofermentative from heterofermentative LAB that utilize fructose. SRA

## Campylobacter

2239

Baggerman (WI), Koster (T) and. **A comparison of enrichment and membrane filtration methods for the isolation of Campylobacter from fresh and frozen foods.** *Food Microbiology* 9(2); 1992; 87-94

Fifty-four fresh and 21 frozen raw poultry meat samples were analysed for the presence of *Campylobacter* in 25 g samples using the traditional method (the membrane filter technique and the Falcon membrane filter unit). The number of *Campylobacter*-positive samples for the fresh poultry meat with each method was 39, 39 and 48 respectively, and for the frozen samples was 7, 9 and 14 respectively. The Falcon membrane filter method gave the highest recovery with a 2 day test for isolation and confirmation of *Campylobacter jejuni/coli*. The detection limit of the latex agglutination test varied from  $1.0 \times 10^3$  to  $7.0 \times 10^5$  cells  $\text{ml}^{-1}$ . Cross reactions with 21 non-*Campylobacter* strains isolated from meat were not observed. SRA

## Escherichia coli

2240

Fratamico (PM), Schultz (FJ) and Buchanan (RL). **Rapid isolation of Escherichia coli O157:H7 from enrichment cultures of foods using an immunomagnetic separation method.** *Food Microbiology* 9(2); 1992; 105-113

A method employing immunomagnetic beads was developed for the isolation of *Escherichia coli* O157:H7. Magnetic beads precoated with sheep anti-rabbit iGG were coated with rabbit antiserum against *E. coli* O157. The level of bacteria, amount of beads, amount of antibody coating the beads and incubation time were varied to determine their effects on recovery of the organism. The sensitivity of the test for recovery of *E. coli* O157:H7 was  $1 \times 10^1$  cfu  $\text{ml}^{-1}$ . The organism was selectively recovered from 24



h enrichment cultures of meat products in which the initial inoculum level was 1 bacterium g<sup>-1</sup>. Sorbitol negative colonies were selected from Sorbitol MacConkey agar and were positively identified as *E. coli* using a direct fluorescent antibody procedure. The results indicate that immunomagnetic separation is a convenient and rapid method for the isolation of *E. coli* 0157:H7 from foods. AA

#### **Leuconostoc oenos**

2241

Pitotti (A), Dal Bo (A) and Boschelle (O). **Assay lysozyme by its lytic action on *Leuconostoc oenos* : A suitable substrate at acidic pH.** *Journal of Food Biochemistry* 15(6); 1991; 393-403

A bacterial species (*Leuconostoc oenos*), well suited to acidic pH values, is proposed as substrate for the spectrophotometric detn. of lysozyme activity. The principal advantage of this organism as the substrate is the ease of investigating lysozyme behaviour at acidic pH. The sensitivity is lower than with *Micrococcus lutes*, but data are highly reproducible. AA

#### **Listeria monocytogenes**

2242

Peterkin (PI), Idziak (ES) and Sharpe (AN). **Use of a hydrophobic grid-membrane filter DNA probe method to detect *Listeria monocytogenes* in artificially contaminated foods.** *Food Microbiology* 9(2); 1992; 155-160

A hydrophobic grid-membrane filter colony hybridization method using a digoxigenin-labelled DNA probe was compared to the conventional Health protection Branch method for the detection of *Listeria monocytogenes* in artificially inoculated foods. Three food products (soft cheese, raw milk, ground chicken) were inoculated with *L. monocytogenes*, *L. welshimeri*, or *L. seeligeri* at levels of either 1 or 100 *Listeria* cells g<sup>-1</sup> of food. Statistical analysis of the results (a total of 120 comparisons) showed that there was no evidence of a significant difference ( $\alpha = 0.05$ ) between the results for these 2 methods. A commercial counter, the HGMF Interpreter, was used for electronic data acquisition. AA

#### **Staphylococcus aureus**

2243

Ballesteros (SA), Chirife (J) and Bozzini (JP). **Antibacterial effects and cell morphological changes in *Staphylococcus aureus* subjected to low ethanol concentrations.** *Journal of Food Science* 58(2); 1993; 435-438

Ethanol in low concn. (5-10% wt.) affected aerobic growth (at 37°C) of two strains of *Staph. aureus*. Growth inhibition in lab. media was observed with ethanol about 6-7% wt. *aw* of approx. 0.97. This suggested that the ethanol antibacterial effect was not only from its *aw* lowering ability. Electron microscopy observations showed intense morphological modifications in cells in broth with 5% to 6.5% ethanol, and clearly indicated that cell wall changes of *Staph. aureus* was partly responsible for the antibacterial action of ethanol. AA

#### **Fungi**

2244

Samoon (AH). **Role of 'molds' in spoilage of food and beverages.** *Beverage and Food World* 20(1); 1993; 25, 27

Molds (*Aspergillus*, *Cladosporium*, *Sporotrichum*, *Thamnidium*, *Rhizopus*, *Penicillium*, *Geotrichum*, *Botrytis*, *Alternaria*, *Monilia*, *Helminthosporium*, *Fusarium*, *Collectotrichum*) which are commonly prevalent in foods and beverages, under commercial conditions are classified and vital morphological features of these molds are discussed in brief. The incidence of such molds and conspicuous spoilage changes caused by them in food substrates are also enumerated. SRA

#### **Mushrooms**

2245

Mau (JL), Beelman (RB) and Ziegler (GR). **Factors affecting 1-octen-3-ol in mushrooms at harvest and during postharvest storage.** *Journal of Food Science* 58(2); 1993; 331-334



Harvesting experiments revealed that immature whole mushrooms with closed veils had higher 1-octen-3-ol levels than more mature whole mushrooms with open veils. The 1-octen-3-ol content of the gills was higher in immature mushrooms with closed veils, gradually decreased with maturity as the veil opened, and finally increased after the gills were well exposed. Postharvest experiments demonstrated that storage temp. influenced the activity of lipoxygenase-hydroperoxide lyase, but no differences in 1-octen-3-ol content was observed. Enzyme activity as well as 1-octen-3-ol content decreased during storage. Addition of  $\text{CaCl}_2$  to irrigation water, employed to improve quality and shelf-life of fresh mushrooms, increased the amount of 1-octen-3-ol immediately after harvest. AA

2246

Kuyper (L), Weinert (IAG) and McGill (AEJ). **The effect of modified atmosphere packaging and addition of calcium hypochlorite on the atmosphere composition, colour and microbial quality of mushrooms.** *Lebensmittel-Wissenschaft und -Technologie* 26(1); 1993; 14-20

The effect of modified atm. packaging in combination with the addition of calcium hypochlorite (CH) on the atm. composition, colour and microbial quality of mushrooms was investigated. A modified atm. which slowed down discolouration was obtained in perforated LDPE packages. Addition of CH did not influence the atm. composition of the treatments. Low oxygen concn. were reached in the PVC treatments which increased browning. No benefit to colour values was obtained with the addition of CH. Addition of CH (0.4 g/L) reduced all the microbial counts in the PVC treatment with two perforations significantly. The coliform and total plate counts of all the different packaging methods were significantly lower at the end of the storage period with the addition of 0.8 g/L CH. AA

## Yeasts

### *Candida rugosa*

2247

Riaublanc (A), Ratomahenina (R) and Galzy (P). **Study of a lipase from *Candida rugosa*** Diddens and Lodder. *FAT Science Technology* 95(4); 1993; 134-137

Lipasic system of *Candida rugosa* (CBS 613) strain was studied. The enzyme was purified in one step by hydrophobic chromatography. The properties of this lipase were determined. It is an oligomeric enzyme composed of 5 identical monomers of  $46 \text{ kg mol}^{-1}$ . Its optimum reaction conditions are  $\text{pH} = 7$  and  $\text{temp.} = 40^\circ\text{C}$ . This enzyme presents a rapid thermal denaturation and then a more stable form. It is a cell-bound lipase which is induced by triacyl glycerols. This enzyme presents a high specificity for external positions on glycerol. AA

## Hygiene

2248

Grant (IR) and Patterson (MF). **Sensitivity of foodborne pathogens to irradiation in the components of a chilled ready meal.** *Food Microbiology* 9(2); 1992; 95-103

The sensitivity of 5 foodborne pathogens to irradiation in the components of a roast beef meal (beef, gravy, cauliflower, roast potato and mashed potato) was investigated. *Bacillus cereus* (vegetative cells) was the most radiation-sensitive ( $D_{10} = 0.126 - 0.288 \text{ kGy}$ ) of the pathogens studied. *Clostridium perfringens* (vegetative cells), *Salmonella typhimurium* and *Listeria monocytogenes* had similar  $D_{10}$  ranges (0.342 - 0.586, 0.371 - 0.697 and 0.301-0.648 kGy, respectively). *Staphylococcus aureus* had  $D_{10}$  values ranging from 0.252-0.427 kGy. When irradiated in gravy the pathogens generally had lower  $D_{10}$  values than in any of the other 4 components. AA

## BIOTECHNOLOGY

Nil

## TISSUE CULTURE

Nil



## Clouding agents

2249

El-Shamel (Z) and El-Zoghbi (M). **Production of two natural clouding agents from orange and lemon peels.** *Indian Food Packer* 47(3); 1993; 35-46

Two beverage clouding agents were produced from peels of Valencia orange and of Baladi lemon. Three enzyme preparations, Pectinex ultra spl., Novo ferm and ultrazyme 100 were used under their estimated optimum conditions to hydrolyze pectin of the peel. Novo ferm, which yielded highest cloud substances, was used for preparing the two clouds. The chemical and physical properties of the clouds were evaluated. During storage the colour of lemon cloud was more stable than that of orange which showed significant browning. Addition of 5, 10 and 15% of the clouding agent improved colour and appearance of the drinks without bitterness. The cloudiness of the drinks stored at 25°C was stable even after 42 days. GS

## Colourants

2250

Keshava Prasad (PK), Bhat (GS) and Sethu Rao (D). **The 'colour crisis' in food industry and the search for 'safe' natural colourants.** *Indian Dairyman* 45(8); 1993; 352-356

Structure, stability, biosynthesis, extraction and application in food industry of natural colorants like anthocyanins, betalaines and lycopenes and their role in food safety are discussed. GS

2251

Sudhir Singh and Khanna (SK). **Toxicological evaluation of permitted food colours - Part V. Triarylmethane dye (Blue).** *Indian Dairyman* 45(8); 1993; 361-363

Short term and long term studies on toxicological assessment of blue triarylmethane dye (Brilliant blue FCF, a permitted food colour) revealed no harmful effect at the max. PFA limit of 0.02% in rats and beagle dogs. GS

## Flavourants

2252

Nursten (HE). **Macromolecules and flavour.** *Food Science and Technology Today* 6(3); 1992; 156-159

Examines the physical presence, binding flavourants, chemical breakdown and catalytic flavour formation of macromolecules in relation to flavour. GS

## Stabilizers

2253

Anon. **Gum arabic products protect spray-dried flavours against oxidation.** *Food Technology* 47(2); 1993; 130-131

The effectiveness of the two gum products (Arabic FT and Arabic FT-1) as carriers for spray-dried flavours was evaluated. The results determined that the gum arabic products outperformed the other carriers. The advantages offered by the two gum products are natural labelling, clean taste, nutritional benefits, free from sediment, cost effective and Kosher status. CSA

## Thickeners

2254

Singhal (RS) and Kulkarni (PR). **Guidelines for selecting a starch-based thickener in canned foods.** *Indian Food Packer* 47(5); 1993; 17-18

Criteria for selection of starches like epichlorohydrin, cereal modified tapioca, acetylated potato, low thermophile as thickeners in canning industry for baby food, soups, sauces, piefillings, gravies, vegetables in sauces, speciality dinner products like chowmein, chilli, spaghetti, stews, cream, style corn etc. are discussed. GS



2255

Stainsby (G). **Structure and gelation of polysaccharides.** *Food Science and Technology Today* 6(4); 1992; 218-225

Emphasises the role of commercial food additive polysaccharides like glucomannan, xanthan gum, carboxymethyl carrageenans, agarose pectins, xyloglucan etc. in thickening and gelling of food describes the mol. structure, viscosity, gelation. GS

## CEREALS

2256

Svanberg (U), Lorri (W) and Sandberg (A-S). **Lactic fermentation of non-tannin and high-tannin cereals: Effects on in vitro estimation of iron availability and phytate hydrolysis.** *Journal of Food Science* 58(2); 1993; 408-412

The effect of Fe availability estimated *in vitro* and phytate hydrolysis was investigated in non-tannin and high-tannin cereals, lactic fermented as flour/water slurries or gruels. A natural starter culture initiated fermentation and addition of germinated flour and phytase in the fermentation process was tested. Lactic fermentation of non-tannin cereals with added flour germinated sorghum seeds or wheat phytase increased Fe solubility from about 4% up to 9 and 50%, respectively. Soaking flour in water before adding starter culture had a similar effect. The increase in soluble Fe was strongly related to enzymatic degradation of phytate ( $p < 0.001$ ). The reduction of inositol hexa- and pentaphosphates was about 50% with added germinated flour. Reduction was > 90% after soaking the flour prior to fermentation and almost complete with 50 mg phytase added. High-tannin cereals showed a minor increase in soluble Fe after fermentation, ascribed to the inhibitory effect of tannins (both on Fe solubility and on enzymatic hydrolysis of phytate). Lactic-fermented cereal foods have a potential in developing countries to improve Fe nutrition. AA

2257

Frazier (PJ). **Functionality of cereal macromolecules.** *Food Science and Technology Today* 6(4); 1992; 226-234

The ability of proteins from wheat to form an elastic, extensible, gas-retaining dough is the major area of macro molecular functionality considered here. Aspects covered include salt-soluble proteins, gliadin proteins, glutenin proteins, lipid binding proteins (ligolines, s-proteins), dough development and improver response, rheology of non-wheat dough (barley and rye). GS

2258

Dahlin (K) and Lorenz (K). **Nitrogen solubility of extruded cereal grains.** *Lebensmittel-Wissenschaft und -Technologie* 26(1); 1993; 49-53

Six whole-grain cereals and quinoa were examined to determine extrusion processing effects on nitrogen solubility. Eight extrusion conditions were applied and effects of cereal var., extrusion temp., rpm and feed moisture on N solubility were observed. N solubility was determined spectrophotometrically. Extrusion conditions resulting in least overall mean percent N solubility across all cereals studied were observed to be 15% feed moisture, 100°C/150°C product temp. and 100 rpm. A consistent pattern was observed across all cereals with regard to extrusion combination: 25% feed moisture, 100°C/150°C product temp. and 150 rpm, resulting in the most favourable overall mean per cent N solubility profile. Extruded rye and quinoa exhibited improved N solubility over unprocessed counterparts at extrusion conditions of 25% feed moisture, 100°C/150°C product temp. and 150 rpm. Unprocessed corn, millet and low-tannin sorghum remained more highly soluble than extruded counterparts, indicating a loss in protein functionality after extrusion. Extrusion, in general, improved N solubility of wheat. High tannin sorghum was particularly insoluble in both the unprocessed and extruded states. AA



## Paddy

2259

Prakash (A) and Jagdiswari Rao. **Deltamethrin: A paddy seed protectant against storage insects under natural conditions.** *Bulletin of Grain Technology* 30(2); 1992; 113-118

Synthetic pyrethroid deltamethrin (K-Othrine) (2.5% WP), as paddy grain protectant against storage insects was evaluated for a period of 48 wk under natural conditions of insects infestation in hot and humid climate. It was tested by direct seed treatment by admixing treated husk with grains and also by treating storage containers like doli and gunny bags. Absolute grain protection was achieved for 48 wk at doses of 8 mg deltamethrin/kg grains in direct grain treatment of treated paddy husk admixed with the grains, when coupled with the treatment of storage containers at the rate of 80 mg/m<sup>2</sup> of surface area. However, at lower doses, grain protection was achieved for lesser periods. Deltamethrin treatments did not adversely affect grain viability. AA

2260

Kumar (S), Prasad (T), Shina (RK) and Dubey (A). **Effect of volatile compounds as short-term preservative for paddy in conventional storage.** *Bulletin of Grain Technology* 30(2); 1992; 125-131

To prevent fungal infection of paddy (*Oryza sativa* L.) var. Sita and to maintain their germinability under kothi storage, 10 antifungal volatile compounds with 1, 5 and 10 µl/g concn. were tested as possible preservatives. Treatment with 5 µl/g 2-butanone resulted in complete inhibition of fungal infection after 2 months. Seeds without treatment showed rapid loss in germination %. Treatment with chloroform, acetone and 2-butanone retained the germinability to the level of 84, 73 and 92% respectively. AA

2261

Singaravadivel (K). **Assessment of losses in storage of paddy with different moisture.** *Bulletin of Grain Technology* 30(2); 1992; 151-158

Shrinkage, dry matter loss, milling outturn and microbial growth in TKM 9 paddy with 14.5, 17.0, 19.2 and 23.9% moisture lots stored up to 12 months were studied. Moisture content decreased in all lots significantly within 30 days. Loss in wt. due to driage of paddy increased significantly during 6-8 months and slightly thereafter. Wt. loss sustained by these lots were 6.25, 6.64, 8.36 and 13.52%, after 12 months storage. Dry matter loss 0.07, 0.19, 1.00 and 1.96% after 30 days storage increased to 1.45, 2.30, 3.86 and 4.86% respectively after 12 months storage. Outturn of raw milling increased from 69.5 and 65.4 to 72.9 and 70.7% for 14.5 and 17.0% moisture level after 2 month storage and it declined thereafter. On the other hand in paddy with 19.2 and 23.9% moisture level, it decreased to 66.6 and 63.1 and from 67.8 and 65.2% over the period of storage. Parboiled paddy milling also showed the same trend. AA

## Rice

2262

Yook (C), Pek (U-H) and Park (K-H). **Gelatinization and retrogradation characteristics of hydroxypropylated and cross-linked rices.** *Journal of Food Science* 58(2); 1993; 405-407

Chemically modified rices were prepared by treating with propylene oxide and epichlorohydrin. Gelatinization and retrogradation characteristics of these modified rices were investigated by using DSC and amylograph. Hydroxypropylation of rice caused an extreme decrease in gelatinization temp. from 62 to 50°C and reduced the retrogradation rate of cooked rice. In rice treated by both hydroxypropylation and cross-linking the retrogradation was reduced more than for hydroxypropylated rice. AA

2263

Lal (J), Arora (KK), Shivshanker and Lal (S). **Assessment of driage loss/gain in rice in commercial warehouses in Haryana.** *Bulletin of Grain Technology* 30(2); 1992; 103-107

Driage loss/gain in rice were assessed monthwise using the moisture content formula and by cent per cent weightment basis upto one



yr of storage. The min. and max. wt. loss recorded after 4 and 6 months of storage were 0.45 and 1.65% respectively in rice at FCI Food storage Depot, Ambala Cantt. and Karnal. Further, the losses estimated by formula ranged from 0.23 to 2.27% after 2 and 8 months of storage respectively. It was interesting to note drilage gain during March, June, July, October and November, compared to the preceeding the above cited months. AA

2264

Srivastav (PP) and Jain (RK). **Traditional rice based fermented foods: A case study.** *Beverage and Food World* 20(1); 1993; 26-27

In this paper rice based fermented foods are briefly described. They include cooked fermented parboiled rice (*Pakhala*), fermented parboiled rice beverage (*torani*), blackgram pancake (*biri peetha*), rice pancake (*jao peetha*) and sesame pancake (*Khasa peetha*). SRA

## Wheat

2265

Singh (G), Thapar (VK), Singh (J), Seghal (VK) and Paul (S). **Biochemical losses due to insect-infestation of stored wheat grains in relation to different kinds of storage structures.** *Bulletin of Grain Technology* 30(2); 1992; 108-112

Modern (metal bins, pucci kothis) and traditional (gunny bags, kutchi kothi, bharola, bharoli etc.) storage structures were used to assess the biochemical losses in stored insect infested wheat grains. Gluten contents, free fatty acids (FFA) and alcoholic acidity were determined. Quality losses were min. in wheat grains stored in metal bins and pucci kothis than in Kutchi kothis, bharola and gunny bags. FFA was 0.89% in wheat grains stored in traditional storage structures as compared to 0.70% and 0.72% in the metal bin and pucci kothi respectively. Gluten contents in wheat grains stored in modern structures were higher (8.82% for metal bins and 8.77% for pucci kothis) as compared to that (7.44%) in gunny bags. Alcoholic acidity was higher in wheat grains stored in traditional structures than in modern structures. GS

2266

Punia (D), Duhan (A) and Chauhan (BM). **Physical and nutritional changes in wheat grain during domestic storage in a Haryana village.** *Bulletin of Grain Technology* 30(3); 1992; 236-241

A survey on the domestic level wheat storage in 2 villages in Haryana, India revealed that 75% families preferred open houses, 20% air tight rooms and 5% gunny bags. Wheat grains stored in open house storage were collected at 3, 6 and 9 months and analysed for physical and chemical changes. Insect infestation started within 3 months of storage. The most common insect was *Rhizopertha dominica*. A significant portion of protein, fat, starch and sugars in the damaged kernels was eaten away by the insects. Storage between 6th and 9th months had the most disparaging effect on protein (17.77 to 46.6) and starch (33.29 to 53.45%) content of the damaged kernels. Uric acid in wheat grains increased with storage period, the increase being 2 fold after 9 months. AA

2267

Appaiah (KM), Sreenivasa (MA) and Nagaraja (KV). **Detection and determination of deltamethrin in formulations and residues in wheat.** *Indian Food Packer* 47(5); 1993; 61-63

A TLC method which could be used for the detection of deltamethrin in formulations and surface residues in wheat was developed using potassium permanganate-sulphuric acid reagent. The method could detect 0.5 p.p.m. residue from wheat. Artifacts from wheat samples did not interfere with TLC analysis of deltamethrin. Rate of flow (rf) of artifacts in TLC were 0.65, 0.49 and 0.18 as against the rf of 0.91 for deltamethrin. Formulations of deltamethrin, 2.8% water disposable powder (decis) and K-othrin (2.8% emulsifiable concentrate) did not give interfering spots in TLC. UV method for estimation of deltamethrin in formulations and pure standards developed at optical density at 224 nm, gave 99 and 100% recovery respectively. AA



2268

Bakhshi (AK), Sehgal (KL) and Saxena (AK). **Quality characteristics of wheat varieties of Punjab.** *Indian Miller* 24(1); 1993; 7-12

HD 2329 the most prevalent wheat var. grown in 70% of cultivated area in Punjab, requires min. inputs, and gives relatively higher yields but qualitatively found instable having relatively lower protein, sedimentation and loaf vol. Var. SKAML-1, PBW 120, PBW 154 and PBW 175 being promising for millers and bakers, have above 13% protein, 50 cc sedimentation value, 70% water absorption and 600 cc loaf vol. The particle size analysis showed range of 150-180  $\mu\text{m}$  (majority), and least particle size range of 75-125  $\mu\text{m}$  followed by particle size range of 212-300  $\mu\text{m}$ . The var. HD 2329, PBW 222 and WL 2205 contained 50% particles in the size range of 180  $\mu\text{m}$ . The least number (< 20%) was observed in WL 711 and PBW 226, and the highest number (150  $\mu\text{m}$ ) in SKAML-1, PBW 175 and commercial atta (wheat flour). SRA

2269

Kishore (N), Dubey (NK) and Mishra (AK). **Efficacy of some essential oils against fungi causing deterioration of *Triticum aestivum* during storage.** *Indian Journal of Microbiology* 33(4); 1993; 277-280

Essential oils isolated from the leaves of *Anethum graveolens*, *Chenopodium ambrosioides*, *Citrus medica* and *Lippia alba* were tested for their potentiality as natural fumigants to protect *Triticum aestivum* (wheat) from fungal deterioration during storage. *Chenopodium* oil was found to provide complete protection to fumigated wheat samples from all the fungi even at 1000 p.p.m. without showing any phytotoxic property while the other 3 oils exhibited a narrow fungitoxic spectrum. AA

2270

Syed (HM), Indani (SB), Annapure (SG) and Bodhankar (SS). **Physico-chemical characteristics of Indian wheats - a review.** *Indian Miller* 24(2); 1993; 43-47

Physical parameters, protein, gluten and mineral contents of Indian wheats are reviewed. SRA

2271

Seguchi (M). **Contribution of wheat starch granule hydrophobicity to pancake texture.** *Cereal Foods World* 38(7); 1993; 493-497

Pancakes baked from flours either chlorinated or heat treated exhibited strong springiness and low gumminess. The starch granules separated from these different flours showed hydrophobicity and bound to the tailings fraction in flour batters. The improvement of pancake textures is thought to be related to the hydrophobicity of the starch granules. CSA

### Wheat bran

2272

Yamada (H), Itoh (K), Morishita (Y) and Taniguchi (H). **Structure and properties of oligosaccharides from wheat bran.** *Cereal Foods World* 38(7); 1993; 490-492

The preparation of wheat bran oligosaccharides (WBO) from wheat bran hemicellulose is described in this article. The physicochemical and physiological properties of WBO shows that it is expected to be an effective material as a food additive. CSA

## MILLETS

### Corn

2273

Watson (SA) and Keener (HM). **Evaluation of a modified stein breakage tester for more rapid determination of corn breakage susceptibility.** *Cereal Foods World* 38(8); 1993; 565-569

A newly designed automated grain breakage device, the Ohio Grain Breakage Tester (OBT), is described. The design of this device is based on a previously reported modification of the Stein CK2M Breakage Tester (SBT), which reduced the grinding time from 2 min to 30 sec



and increased grain charge from 100 to 200 g. In the OBT, the grinding step has been completely automated, but the sieving and weighing steps are still manual. Total time for determining breakage susceptibility (BS) is 3.5 - 4 min for the OBT and 7-8 min for the SBT. A prototype model of the OBT was compared with the SBT on 235 commercial corn samples from a two-yr period. Differences in BS values were not statistically different. The correlation coeff. comparing results of the SBT and OBT were 0.91-0.98 for a comparison of 226 corn samples and 0.98 for a small (5 samples) comparison. This indicated that the two instruments measured the same parameter. The OBT had a greater precision than did the SBT as demonstrated by smaller standard deviations and coeff. of variability. Particle size analyses by sieving showed similar patterns for both machines. The two machines were operated over a range of grind times on corn of wide BS differences. Slopes were similar. The OBT is a good replacement for the SBT because it is faster, more precise, and when combined with equipment to automate the sieving and weighing steps, provides a rapid and reliable device for evaluating corn for relative brittleness. AA

2274

Watson (SA), Kreider (WD), Sciarini (MJ) and Keener (HM). **Evaluation of a modified stein breakage tester for more rapid determination of corn breakage susceptibility.** *Cereal Foods World* 38(8); 1993; 570-575

The only commercially available device for measuring the susceptibility of corn grain to breakage during subsequent handling has been the Stein CK2M Breakage Tester (SBT). Many lab. studies have shown that corn breakage susceptibility (BS), as determined with this device, is well correlated with corn breakage in commercial channels. However, as presently designed, the SBT is not suited for routine commercial testing. A modified SBT has been designed that reduces grinding time from 2 min to 30 sec. It is equipped with a grinding chamber (bowl) that holds twice as much corn as does the conventional SBT and has a means for quick discharge of the grist. This latter feature reduces manual operation, thus making automation a possibility. The

breakage susceptibility values obtained with the Modified Stein Breakage Tester (MSBT) were highly correlated with the SBT values. The breakage values obtained with the MSBT were significantly lower than those obtained with the SBT, but BS results were highly correlated ( $r = 0.93$ ). A study of the effects of grinding time showed that BS values are very sensitive to small changes in this variable, which must be controlled to plus or minus 1.0 sec. Variations in the wt. of corn tested over a range of 185-215 g did not affect BS detn. Evaluations of the MSBT suggest that it is a good substitute for the SBT and is a sound basis for development of a semiautomatic prototype. AA

## Popcorn

2275

Mohamed (AA), Ashman (RB) and Kirleis (AW). **Pericarp thickness and other kernel physical characteristics relate to microwave popping quality of popcorn.** *Journal of Food Science* 58(2); 1993; 342-346

The popping performance of 18 popcorn hybrids was studied using 2 microwave treatments, with and without salt, and 1 conventional method. Differences in popping quality indices between the 2 microwave treatments, indicated a negative effect of salt on popping for the majority of hybrids. Pericarp thickness, kernel vol., sphericity, diam. ratio, thousand kernel wt., hardness and density were investigated. Pericarp thickness gave highest correlation with expansion vol. in microwave and conventional popping while sphericity correlated slightly better in unsalted microwave popping. Regression models, which predict expansion vol. in terms of pericarp thickness and kernel shape and size, were developed for both microwave and conventional popping. AA

## Sorghum

2276

Parasher (RC), Chauhan (GS) and Singh (D). **Varietal differences in some physical and chemical characteristics of grain sorghum (*Sorghum bicolor* (L.) Moench).** *Bulletin of Grain Technology* 30(2); 1992; 159-163



Nine var. of sorghum were evaluated for their physical and chemical characteristics. Based on visual observations, they were classified as small, medium and large. The hectolitre and thousand kernel wt. ranged from 77.9 to 81.5 kg and 15.8 to 29.5 kg respectively. Var. CSV-10 contained highest protein content and CSV-11 max. fat content. Depending on the var., a wide variation was found in the content of minerals and sugars. Glutelin and prolamins were the major protein fractions in all the var. Protein recovery was max. in var. SPV-475. The flour yield was found in direct proportion with thousand kernel wt. AA

2277

Hassan Shazali (ME). **Matmora (underground pit) storage of sorghum in the Sudan.** *Bulletin of Grain Technology* 30(3); 1992; 207-212

In Sudan small farmers, traders and government use 3 types of matmora underground pit for storage of sorghum. Matmora is an air tight container with the advantages of low construction costs, reduced losses, reduced pest control costs, environment stability, maintenance of air tightness and high security. However, it has the disadvantages of reduced grain quality, reduced seed viability, inspection difficulties, handling inconveniences and restricted removal of grain. Improvements for matmora are suggested. GS

### Sorghums

2278

Ramanurthy (R) and Gopalan (M). **Nutrient changes in sorghum grains by earhead bug, *Calocoris angustatus* (Lethierry).** *Bulletin of Grain Technology* 30(3); 1992; 258-259

Nutrient content of sorghum seeds infested by sorghum earhead bug, *Cal. angustatus* Lethierry, was analysed. Nitrogen content in var. Co 23 infested seeds was 1.05% and in K4 over healthy seeds 1.62%. This may be due to increase in the free amino acid content in infested seeds. Phosphorus content in infested var. Co 23 seeds was 16.36% and in K4 over healthy seeds 33.77%. GS

2279

Proulx (WR), Weaver (CM) and Bock (MA). **Trypsin inhibitor activity and tannin content do not affect calcium bioavailability of three commonly consumed legumes.** *Journal of Food Science* 58(2); 1993; 382-384

Three cv of beans (*Phaseolus vulgaris*) with trypsin inhibitor activity (TIA) and tannin concn. were tested for their Ca bioavailability. Raw and cooked legumes were fed to 6 groups of 6-wk old male Sprague-Dawley rats. The absorption of Ca from legumes by rats averaged 47.1 plus or minus 7.5% of IP dose. Av. phytate content of the legumes was 1.7% and oxalate 0.37%. Ca absorption was unaffected by TIA or tannin content. GS

2280

Abdel-Gawad (AS). **Effect of domestic processing on oligosaccharide content of some dry legume seeds.** *Food Chemistry* 46(1); 1993; 25-31

The effect of soaking in tap water and 0.5% sodium bicarbonate sol., cooking and autoclaving of unsoaked and soaked seeds on oligosaccharide contents of faba bean (*Vicia faba* L.), lentil (*lens culinaris*), common bean (*Phaseolus vulgaris*) and cowpea (*Vigna sinensis*) was studied by GLC. High losses of raffinose; stachyose and verbascose were caused by soaking for 12 h in tap water or sodium bicarbonate sol. followed by autoclaving. Soaking in tap water is preferable because of susceptibility of some vitamins of the B-complex group to alkali particularly thiamine and riboflavin. SD

2281

Elhardallou (SB) and Walker (AF). **Binding of Zn by three starchy legumes in the presence of Zn alone or with Fe, Ca, Mg and Cu.** *Food Chemistry* 46(1); 1993; 43-48

Zn binding capacity of butter beans, broad beans and lentils in raw, cooked and fibre-rich fraction (FRF) forms in conditions simulating small intestine was investigated. FRFs showed



highest Zn binding with separate Zn addition and lowest with Zn addition in combination with other minerals. Raw and cooked forms bound significantly more Zn than FRFs. More significant Zn binding was noted when Zn was added together with Fe, Ca, Mg and Cu than with Zn addition alone. SD

2282

Hung (T) and Nithianandan (V). **Preparation and evaluation of noodles supplemented with chickpea and lupin flours.** *ASEAN Food Journal* 8(1); 1993; 26-30

Unsalted noodles fortified with lupin (*Lupinus*) or chickpea (*Cicer arietinum*) flours or a mixture of the two rated more favourably than those prepared from wheat flour. The fortified products had 37% more protein than the control and high fibre (6-10 times the control level) and improved quality such as colour, taste and texture but suffered from a cooked wt. loss. This product could be attractive as health foods and as economical high protein products. SRA

2283

Bressani (R). **Grain quality of common beans.** *Food Reviews International* 9(2); 1993; 237-297

This paper discusses the importance of arriving at grain quality characteristics in food grain legumes, an activity which requires the participation of breeders, agronomists, food scientists and nutritionists. Aspects include, grain quality of beans, components of grain quality of common beans (*Phaseolus vulgaris*), effect of processing (moist cooking, dry-thermic processing, germination, fermentation, dehulling and milling, irradiation), acceptability characteristics (physical aspects of the grain, factors related to postharvest biochemistry, handling and storage), nutritional factors (positive attributes, negative attributes: antinutritional factors, nutrient bioavailability), food products (preparation of bean ingredients, utilization in food products). 430 references. SRA

## Beans

2284

Reyes-Moreno (C) and Paredes-Lopez (O). **Hard-to-cook phenomenon in common beans - a review.** *CRC Critical Reviews in Food Science and Nutrition* 33(3); 1993; 227-286

This review covers, classification, world production and distribution, structure (seed coat, cotyledon), composition and nutritional value (proteins, carbohydrates, lipids, vitamins and minerals, antinutritional factors), grain quality (acceptability characteristics, soaking characteristics, cooking quality), hard-to-cook phenomenon (changes during storage, nutritional significance of bean hardening, possible mechanism of hardening, procedures to prevent bean hardening, reversibility of the hard-to-cook phenomenon, alternative procedures for the use of hard beans). 419 references. SRA

## Chickpeas

2285

Choudhury (BS). **Residual effect of eight vegetable oils on chickpea against pulse beetle, *Callosobruchus chinensis* (Linnaeus).** *Bulletin of Grain Technology* 30(2); 1992; 173-176

Good quality chickpea grain was fumigated with aluminium phosphide (celphos) tablets in air tight rectangular galvanised iron box. Groundnut, sesame, linseed, soybean, neem, castor, safflower, and coconut oils were mixed with the seed at 0.25, 0.50, 1.00/ml/100 g seed. The treated samples were kept for 9 and 12 months at room temp. (20.5 to 21.0°C) and RH (70.7 to 97.0%). Oil treatments showed significant reduction in the number of eggs laid, adult emergence and seed damage due to *Call. chinensis*. Most effective were neem, groundnut, castor and sesame oils while linseed oil was least. Results after 12 months were similar to those after nine months. GS

2286

Singh (A) and Mehta (U). **Mineral and phytic acid contents of chickpea (*Cicer arietinum*) varieties.** *Bulletin of Grain Technology* 30(3); 1992; 242-245

Fourteen chickpea var. were studied for Ca, Fe, Zn and phytic acid contents in whole seeds.



cotyledons and seed coat. Seed coat contained max. Ca and Fe as compared to the whole seeds and cotyledons. Zn content was higher in cotyledons and less in whole seeds and coats. Out of whole seeds and cotyledons, phytate was more in cotyledons and lower in whole seeds. Var. H-83-70 and G-130 were superior to Gaurav in whole seed Ca and Fe contents. Var. H-83-24, H-85-24 is also superior in its Zn content. Var. H-82-2, H-83-23, H-208, G-24, H-355 and C-235 are superior to Gaurav only in Fe content. Compared to Gaurav, the number of var. containing similar or higher whole seeds Fe, Zn and Ca contents were 10, 12 and 10 respectively. Eleven var. contained significantly higher phytate than Gaurav. AA

### Cowpeas

2287

Poonam Singh and Bhattacharya (L). **A study on the methionine content in five improved varieties of cowpea (*Vigna sinensis*) Savi.** *Bulletin of Grain Technology* 30(2); 1992; 177-178

Five improved var. UPC-124, UPC-125, UPC-126, UPC-287 and F<sub>6</sub> Bulk) of cowpea were evaluated for their methionine content which ranged from 0.82 to 1.12% of protein (g per 16 g N). In terms of % dry matter, the methionine content ranged from 0.17 (in F<sub>6</sub>) to 0.25% (in UPC-287). GS

### Dry beans

2288

Rayas-Duarte (P) and Rupnow (JH).  **$\gamma$ -Irradiation affects some physical properties of dry bean (*Phaseolus vulgaris*) starch.** *Journal of Food Science* 58(2); 1993; 389-394

$\gamma$ -irradiated great northern (GN) bean starch (2.5 - 20 kGy) showed apparent increased susceptibility to central fissures. Bean damage during scanning electron microscopy was observed using greater than or equal to 4000X magnification on GN bean starch samples. Approximate mol. wts. estimated by gel filtration chromatography Sepharose Cl-2B of control GN bean starch were: amylopectin  $> 2 \times 10^6$  and amylose  $2 \times 10^5$ . Amylose-like

fraction of irradiated bean starch (20 kGy) revealed two peaks approx.  $6.9 \times 10^4$  and  $1.5 \times 10^5$  daltons. Differential scanning calorimetry showed an increase in gelatinization enthalpy and a small increase in gelatinization peak temp. at 20 kGy suggesting a reorganization of the crystalline and amorphous phases of the starch granule. AA

### Mungbeans

2289

Dutta (A) and Bhattacharya (L). **Interrelationship of cooking quality with physical characteristics in improved varieties of mung bean.** *Bulletin of Grain Technology* 30(3); 1992; 254-255

Cooking quality and physical parameters of 16 var. of mung bean were evaluated. Cooking time was determined by cooking the seeds in open pan, soaking prior to cooking and pressure cooking. Di-ionised water was used. Seed wt. had a positive effect while seed density and swelling index negative effect on the cooking quality. The least % of cooked grains were recorded for UPM-79-1-2 while highest % for UPM 93.8. Cooking after soaking the seed for 60 min showed the highest amount of cooked grains for UPM-74-3-4 while UPM-83-2 and UPM-83-7 were the least cooked. Max. cooking time in pressure cooking was 18 min. K-851, UPM-83-10, UPM-83-6 and UPM-82-4 cooked most easily than Pant Moong-1 and UPM-72-1-2 which had large fibre content. GS

### Peas

2290

Nilamani Das, Saini (SPS) and Bains (GS). **Effect of variety and maturity on quality and dehydrated peas.** *Indian Food Packer* 47(3); 1993; 17-24

Peas from 3 cv. Pb-87, Pb-88, Harabona-B at early (MI) and late (M II) maturity were tested for their suitability to dehydration. Ascorbic acid loss in MI during dehydration was high while M II had high retention varying from 72.8 to 53.3%. Starch reduced during processing by 9 to 14%. Retention of starch in the Harabona-B var. was quite high. The equilibrium relative humidities were similar



upto 50% rh. At 80% rh and above, mould appeared on the product. Harabona-B MI showed lower rehydration ratio (1:3.6) as compared to 1:4.2 of Pb-87 and 1:3.9 to 1:40 of Pb-88 peas. Pb-88 peas took much less cooking time (12 min) than Hb-B (21 min). The cooking time of Pb-87 was close to that of Pb-88. No relationship was observed between phytic P content and cooking quality of the dehydrated peas. Pb-87 var. is preferred for dehydration because of its higher rehydration ratio, better cooking quality and colour. It also had higher soluble sugars and ascorbic acid than other cv. Tender peas of MI were found most suitable for dehydration because of their final moisture content, shorter period of drying and higher rehydration ratio than the peas of delayed M II maturity. GS

### Pigeonpeas

2291

Raghuvanshi (RS), Shukla (P) and Sharma (S). **Chemical composition and cooking quality of pigeonpea (*Cajanus cajan* L.).** *Bulletin of Grain Technology* 30(2); 1992; 145-150

Chemical composition and cooking quality of 9 improved strains of pigeon pea and one released var. were analysed. Highest ash content (4.00%), crude fibre (6.76%), crude fat (2.32%), crude protein (22.75%), carbohydrates (59.53%) energy value (332 kcal/100 g) and Fe content (4.92 mg/100 g) were observed in Pant A-3, Pant A-1-1, Pant A-104, U.P.A.S. 120, Pant A-104, Pant A-104 and PA 83-4-1 respectively. % cooking of the grains were determined in open pan and pressure cooker at various soaking time (60 and 180 min) and cooking time (20.25 and 30 min). Strain Pant 10, PA 83-4 and var. UPAS-120 cooked faster than other strains. Strain Pant A-104 had lowest protein content and remained almost uncooked. Correlation coeff. between cooking % and proximate composition was not significant. Var. could be grouped based on the proximate composition. AA

2292

Tripathi (SC), Vivek Dixit and Chaturvedi (RV). **Efficacy of Seseli oil against storage pests of**

**gram and pigeon pea.** *Bulletin of Grain Technology* 30(3); 1992; 202-206

Seed protectant efficacy of vapour of the essential oil of *Seseli indicum* as a fumigant preservative against fungal and insect pests of gram (*Cicer arietinum* L.) and pigeon pea (*Cajanus cajan* L.) was investigated. Due to its indigenous, biodegradable, non-pollutive and non-phytotoxic nature, this essential oil proves superior to toxic synthetic pesticide. Vapour liberated by the oil at  $0.8 \times 10^3 \mu\text{l/l}$  dose checked the infestation of pulse beetles but failed to show complete inhibition of fungi infesting the seeds of both the commodities. Seeds of treated and control sets showed no difference in their germination % and seedling growth. GS

### Pinto beans

2293

Czarnecki (Z), Gujska (E) and Khan (K). **Extrusion of pinto bean high protein fraction pretreated with papain and cellulase enzymes.** *Journal of Food Science* 58(2); 1993; 395-398, 404

High protein fraction of pinto bean was pretreated with papain and cellulase enzymes and extruded at a temp. of 120°C. The effect of enzyme type and concn., moisture and duration of incubation on expansion, texture, colour, water absorption and solubility, pH, sugars, nitrogen solubility index and *in vitro* protein digestibility of the extrudate were investigated. Enzymatic modification had differential effects on nitrogen and carbohydrate components and on some physical and functional properties of extrudates, depending on type of enzyme and incubation conditions. Results indicated the possibility of controlling protein and fiber hydrolysis at low moisture to obtain a desirable degree of modification to improve extruded products. This method may be used in food applications to obtain new snack type products from beans or their fractions. AA



## Rice bean

2294

Kaur (M) and Mehta (U). **Nutritional and organoleptic characteristics of chapatis and paranthas supplemented with rice bean (*Vigna umbellata*).** *Bulletin of Grain Technology* 30(3); 1992; 246-253

Acceptability and nutritional quality of chapathis and paranthas supplemented with different levels of rice-bean flour were studied. Paranthas prepared with 10, 20, and 30% rice-bean flour were comparable to control. Chapathis with 10% and paranthas at 20 and 30% supplementation tasted best. Calorific value of supplemented chapathis were higher compared to control. In supplemented paranthas the av. crude protein, ash and crude fibre content increased by 18.04, 5.90 and 28.66% respectively and moisture content decreased compared to control. Ca, Fe, Zn and Cu contents in supplemented chapathis increased significantly by 92.73, 11.6, 37.87 and 44.8% and in supplemented paranthas by 88.74, 9.67, 38.94 and 43.33% respectively. In both chapathis and paranthas the amount of sulphur containing amino acids decreased with increasing level of supplementation. GS

## OILSEEDS AND NUTS

### Groundnuts

2295

Suryanarayana Raju (G), Lakshminarayana (K) and Shekar Shetty (H). **Comparative studies on the chemical transformation of lindane and bromophos at laboratory conditions during storage of groundnut.** *Bulletin of Grain Technology* 30(3); 1992; 189-192

Groundnut samples were mixed with lindane and bromophos at 10, 50 and 100 p.p.m., shaken well for uniform concn. and stored in glass bottles at lab. conditions. Samples drawn at periods from 10-60 days were analysed for residues. At 10 p.p.m. level the concn. of lindane decreased from 9.0 to 2.0 p.p.m. and bromophos residue from 9.3 to 2.8 p.p.m. At 50 p.p.m. level lindane decreased from 48.0 to

34.0 p.p.m. and bromophos from 49.0 to 37.5 p.p.m. At 100 p.p.m. concn. the lindane residue varied from 97.0 to 86.0 p.p.m. and bromophos from 98.5 to 87.0 p.p.m. GS

2296

Radadia (LB), Patel (NC) and Chauhan (PM). **Studies on storage characteristics of groundnut.** *Bulletin of Grain Technology* 30(3); 1992; 231-235

Groundnut (var. JL-24) samples, 10 kg each were stored for 180 days in gunny bags, jute bags, polyethylene lined jute bags and metal bins. Open heap was control. Samples drawn at regular intervals of 45 days were analysed for moisture, oil, protein and aflatoxin contents. The max. RH (94%) was observed between 45 to 90 days and lowest (71%) between 135 to 180 days. Highest max. temp. (36.3°C) was observed between 45 to 90 days. With storage period up to 90 days there was an increase in moisture content of kernels from 4.8% to 14.1%, 12.2% and 11.9% and a marked decrease in oil content from an initial oil content of 48.2% of the kernels to 43.8, 44.6 and 44.6% in open heaping, gunny bags and jute bags respectively. In case of polyethylene lined jute bags and metal bins there was slight increase in moisture content, 5.0 and 7.4% respectively and no significant change in oil content in both. The decrease in protein content was more in open heaping, gunny bags and jute bags than in polyethylene lined bags and metal bins. Aflatoxin was not observed in groundnut stored under any method or at any period. GS

2297

Rustom (IYS), Lopez-Leiva (MH) and Nair (BM). **Effect of pH and heat treatment on the mutagenic activity of peanut beverage contaminated with aflatoxin B<sub>1</sub>.** *Food Chemistry* 46(1); 1993; 37-42

Peanut beverage with aflatoxin B<sub>1</sub> (15, 30 and 45 µg/kg) were heat treated (i) 130°C for 20 sec, 140°C for 5 sec and 121°C for 15 min at pH 8.0 (ii) 130°C for 20 sec and 121°C for 15 min at pH 10.2 and (iii) 130°C for 20 sec and 121°C for 15 min at pH 5.0. (i) did not reduce significantly the mutagenic activity; (ii) reduced it by 73.3 - 83.0% (79.4 plus or minus 5.3%)



and 82.5 - 92.5% (86.6 plus or minus 5.2%) respectively and (iii) reduced it by 72.5 - 80.4% (75.2 plus or minus 4.5%) and 70.4 - 74.7% (71.9 plus or minus 2.4%) respectively. Changing the pH from 8.0 to 10.2 or 5.0 did not significantly reduce the mutagenic activity. SD

2298

Nimje (PM) and Gandhi (AP). **Effect of stage of harvest on yield and quality of groundnut (*Arachis hypogaea*).** *Indian Journal of Agricultural Sciences* 63(3); 1993; 177-180

Groundnut grown during 1988 and 1989 was harvested at 5 day intervals starting from 105 days to 130 days after sowing. Crop harvested at 105 days after sowing contained high moisture (37.6 - 40.6%), high % of unfilled pods (35 - 40%) and freen kernels (82 - 84%). Harvesting at 120 days after sowing gave higher pod yields, increased number and wt. of kernels, but beyond 120 days did not show any improvement. Oil content in kernels increased upto 125 days after sowing but decreased thereafter. Protein content increased upto 130 days, and shelling % increased upto 130 days after sowing. The ideal kernel moisture content at harvest should be 12 - 22% which coincides with 117 - 125 days after sowing. KAR

2299

Rustom (IYS), Lopez-Leiva (MH) and Nair (BM). **Extraction of peanut solids with water-effect of the process and enzymatic hyrolysis.** *Lebensmittel-Wissenschaft und - Technologie* 26(1); 1993; 72-75

Peanut solids, for the production of a beverage, were extracted with water using different processes. Double-stage batch extraction, compared to single-stage extraction, significantly increased the recovery of peanut protein, fat, ash and carbohydrates, and thus increased the content of total solids by 35.7%, protein by 5.6%, fat by 56.0%, ash by 9.1% and carbohydrates by 66.7% in the extract. In a double-stage extraction, peanut residue obtained from the first step was treated with carbohydrates in the second step. Hydrolysis of the residue with  $\alpha$ -amylase (pH 6.9, 37°C, 60 min), amyloglucosidase alone (pH 4.0, 55°C, 30 min) and amyloglucosidase in combination with Viscozyme (pH 4.5, 50°C, 60 min) in the

double-stage extraction increased the recovery of carbohydrates by 7.1, 7.7 and 13.4%, respectively. AA

## Mustard

2300

Chakraborty (P), Roy (A), Sengupta (T) and Mukhopadhyay (S). **Studies on mustard (*Brassica juncea*) seeds: Electron micrography and protein characteristics.** *Journal of the Indian Chemical Society* 70(2); 1993; 142-146

Technological advantage of dehulling of mustard seeds for effective utilization of oil and proteins was investigated. EM of mustard seeds showed the location and attachment of different components, and higher magnification was required for distinguishing hull from endosperm. The processes of extraction of oil and protein used are suitable for avoiding glucosinolate hydrolysis which produces isothiocyanates. The protein contents of flour and isolate were 65 and 91% respectively. The essential amino acid content of mustard protein is adequate to make the chemical score 100. Min. point of nitrogen dispersion occurred at pH 4 and 6 due to two isoelectric points. NaCl markedly increased the solubility of mustard protein at the isoelectric point. Mustard protein globulin showed two peaks of 1.7 S and 14.3 S. SRA

## Safflower

2301

Nimje (PM) and Gandhi (AP). **Effect of time of harvesting and nitrogen level on yield and quality of safflower (*Carthamus tinctorius*).** *Indian Journal of Agricultural Sciences* 63(2); 1993; 83-87

Experiment was conducted during 1986-88 with 4 levels of N (0, 30, 60, 90 kg N/ha) and 6 dates of harvesting with 5 days intervals from 135 days after sowing. High moisture content (28.6 - 30.4%) with high immature grains (56.5%) was observed in safflower harvested at 135 days after sowing. Oil and protein content were also low. Grain yield, oil and protein contents were optimum when harvested at 145-160 days after sowing. Moisture content



at this period was 5-15%. N fertilization upto 30 kg/ha significantly increased the grain (20.5%) and oil (37%). Higher doses of N did not significantly improve the 1000-grain wt., germination %, and protein content, but decreased the oil content. N did not influence time of harvest and oil content of safflower. KAR

## Sesame

2302

Madanagopal (B) and Dharmalingam (C). **Pre-treatment methods to control seed deterioration in gingelly (*Sesamum indicum* L.) cv. TMV 3.** *Madras Agricultural Journal* 80(1); 1993; 33-40

Pre-treatments (i) hydration by soaking in water for 0.5 to 8.0 h (ii) moisture equilibration in a saturated atm. for 2 to 96 h and (iii) iodine permeation in an iodine saturated atm. for 10 to 17 h, were given to 4-month-old gingelly seeds followed by drying back to their original moisture in each case. Fresh seeds stored under ambient condition showed significant reduction in germination (35%), root length (50.8%) dry matter content (54.2%) in 14 month of storage. Evaluation of accelerated aged seeds following hydration-dehydration treatment showed significant reduction in the germination % among periods of soaking. Seeds hydrated for 2 h recorded highest germination (69.3%). GS

## Soy proteins

2303

Prudencio-Ferreira (SH) and Areas (JAG). **Protein-protein interactions in the extrusion of soya at various temperatures and moisture contents.** *Journal of Food Science* 58(2); 1993; 378-381, 384

Protein-protein interactions in soya protein extruded at 140-180 were examined and the mechanism for texturization was studied to determine whether it changed within that range of temp. All extrudates resisted retorting in water at 120°C but complete disruption occurred in media containing reducing agents plus sodium dodecyl sulphate. There was not much change in amino acid in extrusion except

for aspartic and glutamic acids, which decreased in extrusion at 140°C. GS

## Soybeans

2304

Beleia (A), Thu Thao (LT) and Ida (EI). **Lowering phytic phosphorus by hydration of soybeans.** *Journal of Food Science* 58(2); 1993; 375-377, 388

Response surface methodology (RSM) was used to study the effects of 3 independent variables at 3 levels of variation (ratio of liquid/solid, temp. and time of hydration) on the phytic and inorganic P concn. of hydrated soybeans. Temp. of hydration was the most important factor in lowering phytic P. Average reduced amount of phytic P was 26% and max. reduction was 36.1% for cotyledons soaked at 50°C. Inorganic P, both in cotyledons and soak water, increased up to 225.8% at 50°C. AA

## Soy products

2305

Herian (AM), Taylor (SL) and Bush (RK). **Allergenic reactivity of various soybean products as determined by RAST inhibition.** *Journal of Food Science* 58(3); 1993; 385-388

Allergenic reactivity of soybean products (sprouts-Sp, tempeh-T, tofu-To, miso-M, mold hydrolyzed soy sauce-MHS, acid-hydrolyzed soy sauce-AHS, and hydrolyzed vegetable protein-HVP) was determined using RAST inhibition. All products inhibited binding of serum IgE from a pool of soy-allergic adults to raw soybean extract bound to microcrystalline cellulose, showing competitive inhibition with increasing protein. M, T, To and MHS showed competitive inhibition only at much higher protein concn., suggesting fermentation may alter or destroy allergenic epitopes. Selective destruction of epitopes was seen for MHS, To, and possibly M and T where inhibition curve slopes were not identical to intact material. Probably protein(s) with antigens common to raw soybean survived during processing of HVP and germination of sprouts. Based on RAST inhibition, these products are potentially hazardous to soybean-allergic individuals. AA



## Toria

2306

Begum (M) and Majumder (SK). **Post-harvest fungal incidence in toria (*Brassica campestris*) seeds with reference to oil quality.** *Bulletin of Grain Technology* 30(3); 1992; 256-257

Oil content and free fatty acids in 19 samples of toria seeds (*B. campestris*) as influenced by the incidence of mycoflora were studied. 6 samples had moisture ranging from 4 to 7% and 20 to 1400 fungal colonies/g of seed with *Aspergillus flavus* and *Fusarium* sp. as the predominant fungi. One sample had 34.2% moisture content with *Fusarium* sp. and 20,000 colonies/g of samples. 8 other samples had moisture content ranging from 8 to 23% with *A. flavus* colonies as the predominant fungus. No significant changes in oil content was recorded as there was no visible mould growth in the sample. By bringing down the moisture content below 10% rapidly, the quality of toria seed oil can be ensured. GS

## TUBERS AND VEGETABLES

2307

Shinohara. **Desmutagenicity of vegetables and fruits.** *JARQ (Japan Agricultural Research Quarterly)* 26(1); 1992; 62-66

The desmutagenic effect of nondialyzable extracts of fresh and freeze-dried vegetables and fruits like spinach, broccoli, eggplant and apple, on some mutagens and carcinogens using Ames test, was analyzed. The highest desmutagenic activity was found in the dialyzates of spinach, cabbage and eggplant. Dialyzates of apple burdock and natsudaiddai pericarp, eggplant, cucumber, sweet potato, Japanese radish and spinach inhibited the mutagenicity of Trp-P-2. The desmutagenic activity was still retained after heating at 100°C for 20 min. Hence even if vegetables are cooked by boiling, they still possess their desmutagenic effects. GS

## Root vegetables

## Beet juices

2308

Belamri (M), Fakhereddine (L) and Tantaoui-Elaraki (A). **Thermophilic bacteria from RT diffuser beet juices.** *Lebensmittel-Wissenschaft und -Technologie* 26(1); 1993; 69-71

120 thermophilic, saccharolytic isolates were obtained from sugar beet extraction juice over 2 successive campaigns. Their identification revealed they all belonged to the *Bacillus* genus. *Bacillus stearothermophilus* and *Bacillus subtilis* were predominant; 36 and 33%, respectively. *Bacillus licheniformis*, *B. pumilus*, *B. alvei*, *B. circulans*, *B. megaterium* and *B. coagulans* were also found. AA

## Carrots

2309

Babic (I), Amiot (MJ), Nguyen-The (C) and Aubert (S). **Changes in phenolic content in fresh ready-to-use shredded carrots during storage.** *Journal of Food Science* 58(2); 1993; 351-356

Phenolic compounds of shredded carrots were characterized and quantified by HPLC and their concn. were measured during storage in air at 4°C. Trans 5'-caffeoylquinic acid amounted to 60% of total phenolic content and accumulated rapidly. Para-hydroxybenzoic acid and p-hydroxybenzoic esters were not found in freshly prepared shredded carrots and their content increased after the first day. Patterns of accumulation varied, between samples from the same carrot cv grown in different geographical areas. When shredded carrots were stored in polypropylene film pouches or in controlled atm. containing 30% CO<sub>2</sub> and/or 0% O<sub>2</sub>, phenolic compounds accumulated very slowly. The increase in phenylalanine ammonia-lyase activity was consistent with accumulation of phenolic compounds and may relate to microbial spoilage. AA



## Tubers

### *Dioscorea rotundata*

2310

Nok (AJ), Ukoha (AI), Ikedlobi (CO) and Akanya (HO). **Malic dehydrogenases from *Dioscorea rotundata* tubers: Purification and properties of two isozymes.** *Journal of Food Biochemistry* 15(6); 1991; 419-435

Two molecular forms of the enzyme malate dehydrogenase (MDH<sub>1</sub> and MDH<sub>2</sub>) have been purified from *Dioscorea rotundata* tubers. The enzymes were resolved on a DEAE-cellulose column and found to be homogeneous with differential mobilities on polyacrylamide gels. Both enzymes appeared to be dimeric proteins with subunit mol. wts. of 30,100 plus or minus 50 and 31,600 plus or minus 250 for MDH<sub>1</sub> and MDH<sub>2</sub>, respectively. The enzymes exhibited maximal catalytic activity within the pH range 6.5 - 7.5 at 37°C and were inhibited by oxaloacetic acid at concn. > 0.25 mM as well as other naturally occurring metabolites (citric acid, isocitric acid,  $\alpha$ -ketoglutaric acid, succinic acid pyruvic acid, aspartic acid, glutamic acid ATP and ADP). The thermal stability and storability of the enzymes at different conditions were significantly different. AA

## Potatoes

2311

Arora (A), Zhao (J) and Camire (ME). **Extruded potato peel functional properties affected by extrusion conditions.** *Journal of Food Science* 58(2); 1993; 335-337

Extrusion cooking of potato peel (PP) waste from processing plants to improve food safety affects functional properties of PP as a high-fiber ingredient in foods. The ground extruded PP was compared with commercial sources of fiber. The effects of barrel temp. (104 and 143°C) and feed moisture (FM) (31, 33.5 and 36% d.b.) on extruder performance was also examined. Torque and die pressure decreased with barrel temp., all variables affected melt temp. Samples were darker at the higher temp. Expansion, Hunter a, and powder bulk density (PBD) decreased with both

variables. Hydration capacity increased with FM. GS

2312

Wu (W) and Lakin (AL). **Estimation of protein in potato tissue by dye binding.** *Food Chemistry* 46(1); 1993; 49-53

A rapid, low-cost, dye-binding procedure employing CI acid orange 12 for the detn. of 'true' protein in freeze-dried potato tissue is reported. SD

2313

Beerh (OP), Manan (JK), Berry (SK) and Joshi (GJ). **Suitability of fresh potatoes of different varieties for the preparation of potato wafers with 'conventional' and 'improved' processes.** *Beverage and Food World* 20(1); 1993; 13-15

Potato wafers were prepared in conventional and improved processes using 10 var. (K. sherpa, K. Jyoti, K. Badshah, K. Sindhuri, K. Chandermukhi, K. Bahar, K. Lauvkar, K. Lalima and Phulwa) of potatoes and were evaluated for their suitability. The physical parameters of these var. were almost same. The total solids (TS) ranged between 16.0 to 21.8%. The min. being in K. Badshah and max. in K. Sherpa respectively. TS were < 20% in K. Jyoti, K. Lauvkar. Residual sugar varied from 0.23 (K. Sherpa) to 0.38% (K. Lauvkar, K. Lalima and K. Badshah). Non residual sugar varied between nil in K. Sherpa to 1.52% in K. Bahar. In conventional process all var. showed varying degree of brown discolouration, which was unacceptable whereas improved process eliminated discolouration of wafers and golden white coloured wafers were obtained from all var., and rated high in overall quality. Var. K. Lauvkar, K. Sherpa and K. Dewa yielded wafers with comparatively lesser number of brown wafers. SRA

## Vegetables

2314

Hough (G) and Alzamora (SM). **Errors in blanching calculations caused by using one common value of thermal diffusivity for different vegetables.** *International Journal of*



The errors in calculations of blanching time and enzyme inactivation (decimal reduction time) when one common value of thermal diffusivity is adopted for all vegetables are considered. Different rates of heat transfer (negligible heat transfer resistance and blanching in water by natural convection), food size, decimal reduction time of the enzyme (D), and reciprocal slope of the log D vs. temp. curve (parameter z), were analyzed. These variables influenced the blanching time more than the thermal diffusivity and consequently, for many industrial situations, a single thermal diffusivity value of  $1.5 \times 10^{-7} \text{ m}^2 \text{ s}^{-1}$  could be used without causing significant errors in blanching calculations. AA

### Broccoli

2315

Bastrash (S), Makhlouf (J), Castaigne (F) and Willemot (C). **Optimal controlled atmosphere conditions for storage of broccoli florets.** *Journal of Food Science* 58(2); 1993; 338-341, 360

The rates of respiration and ethylene production by intact broccoli (*Brassica oleracea* L. Italica group) heads and florets were compared and the optimal atm. for preservation of florets at 4°C was determined. Fresh, precut film wrapped broccoli heads, into florets increased the rate of respiration throughout storage at 4°C in air, in response to wounding stress. Ethylene production was also stimulated after 10 days. Atm. for optimal preservation of the florets were evaluated using continuous streams of the following defined atm. (% CO<sub>2</sub>/% O<sub>2</sub>): 0/20 (air control), 6/1, 6/2/6/3, and 3/2, 6/2, 9/2. The atm. with 6% CO<sub>2</sub> + 2% O<sub>2</sub> resulted in extended storage of broccoli florets from 5 wk in air to 7 wk. Beneficial effects like delayed yellowing, prolonged chlorophyll retention, reduced mould development, reduced offensive odours and better water retention were observed when the florets were returned from CA to 4°C to air at 20°C. Minimal processing had little influence on optimal storage atm. GS

### Amaranth

2316

Guzman-Maldonado (H), Paredes-Lopez (O) and Dominguez (J). **Optimization of an enzymatic procedure for the hydrolytic depolymerization of amaranth starch by response surface methodology.** *Lebensmittel-Wissenschaft und -Technologie* 26(1); 1993; 28-33

This study reports the effect of  $\alpha$ -amylase concn. (0.01 to 0.05 mL/100g), hydrolysis time (5 to 15 min) and incubation temp. (65 to 80°C) on dextrose equivalent (DE) and protein content after liquefaction of amaranth whole flour and an evaluation of the effect of amyloglucosidase concn. (0.05 to 0.6 mL/100g) plus a fixed percentage of pullulanase (0.03 mL/100 g) and of incubation time (12 to 60 h) on DE and protein content of saccharified samples which were previously treated by liquefaction. Response surface methodology was used for this evaluation. Dextrose equivalent was affected ( $P < 0.06$ ) by both linear and quadratic enzyme concn. terms, while hydrolysis time and hydrolysis temp. affected ( $P < 0.06$ ) DE by linear and quadratic terms, respectively. The protein content of the liquefied flour was only affected ( $P < 0.02$ ) by the linear and quadratic concn. terms, while the hydrolysis time effect was only linear ( $P < 0.01$ ). The protein content of the saccharified flour was affected ( $P < 0.11$ ) by the linear and quadratic terms for hydrolysis time and enzyme concn., respectively. Confirmatory tests showed that the regression equations which were generated can adequately predict the performance of the liquefaction and saccharification procedures. AA

### Tomatoes

2317

Subrahmanyam (KV) and Sudha (M). **Economics of linking tomato processing with production and marketing.** *Indian Food Packer* 47(3); 1993; 25-33

A change in the existing procurement price policy is necessary taking into account the cost



of production, prevailing market price and cultivators' profit expectations of tomato industry. A price 40% above the total cost of production satisfies all these requirements. Small scale co-operative tomato processing units in production centres help in cost effective processing, increased availability and export requirements. GS

2318

Subbaiah (K). **Lycopene content in stored tomatoes as influenced by pre harvest applications of S, K and CaCl<sub>2</sub>**. *Madras Agricultural Journal* 80(4); 1993; 237-238

Effect of N, K and CaCl<sub>2</sub> sprays to tomato crops on lycopene content of stored tomatoes was studied. The sprays improved lycopene content of tomato fruits. Combined application of 160 kg N/ha, 50 kg K<sub>2</sub>O/ha and 0.5% CaCl<sub>2</sub> recorded the highest lycopene content (458.44 p.p.m.) in var. Co 1 tomatoes. GS

2319

Padmanaban (NR). **An analysis of production and marketing of tomato**. *Madras Agricultural Journal* 80(5); 1993; 262-264

Cost of cultivation of tomato was Rs. 4,328.12/ha and the marketing cost Rs. 12.50/quintal. Low price and lack of processing and storage facilities were the major problems. GS

## FRUITS

2320

Vijay Sethi. **Prospects and constraints for export of indigenous fruits and vegetable products**. *Indian Food Packer* 47(5); 1993; 37-44

Outlines the prospects for export of indigenous fruits and vegetable products; constraints of export industry, strategies to build up export potential for processed products and the unique properties of fruits and vegetables to develop new nutritional products. GS

2321

Prestamo (G) and Manzano (P). **Peroxidases of selected fruits and vegetables and the possible use of ascorbic acid as an antioxidant**. *Hortscience* 28(1); 1993; 48-50

The various isozymes of peroxidase of a range of vegetables and kiwifruit were compared using sodium dodecyl sulphate polyacrylamide gel electrophoresis followed by specific activity staining. Peroxidase isozymes were determined in potato (*Solanum tuberosum* L.) carrot (*Daucus carota* L.), tomato (*Lycopersicon esculentum* Mill.), kiwifruit [*Actinidia deliciosa* (A.Chev.) C.F.Liang et A.R.Ferguson], cauliflower [*Brassica oleracea* (Botrytis group)], green beans (*Phaseolus vulgaris* L.), and horseradish (*Armoracia rusticana* Gaertn. Mey Scherb.). There was only one isozyme in cauliflower (70 kDa), two in kiwifruit (45-43 kDa), and a range of isozymes (120-36 kDa) in horseradish. Ascorbic acid inhibited peroxidase activity in the extracts. AA

2322

Joshi (VK), Chauhan (SK) and Sharma (R). **Preservation of fruits and vegetables by lactic acid fermentation**. *Beverage and Food World* 20(1); 1993; 9-12

This review article covers: the fermentation process, inoculation with lactic acid bacteria, fruits and vegetable fermentation processes (olive pickling; *Olea europaea*, sauerkraut, fermented cucumber pickles), shelf-life of fermented products, safety of fermented vegetables. Some industrial fermentation in food industry, salting procedures for vegetables and sequence of microbial types during natural fermentation by brined vegetables are tabulated in 3 different tables. 32 references. SRA

## Apples

2323

Casterline (JLJr) and Ku (Y). **Binding of zinc to apple fiber, wheat bran and fiber components**. *Journal of Food Science* 58(2); 1993; 365-368

The capacities of dietary fibers to bind zinc were measured. Max. initial concn. of Zn bound by 50 mg of apple fibre (AF) and wheat bran (WB)



at pH 7.2 was 220 µg. The water soluble fractions binding capacity was 90% lower for AF than for WB. Hemicellulase and phytase slightly increased AF binding capacity but reduced WB capacity. Pectinase increased both AF and WB capacity slightly. Lignin, polypectin, pectin, gum and cellulose had binding capacities in the decreasing order. All the enzymes slightly but significantly increased the binding capacity of the apple fibre. The binding capacity of Zn was not due to a single component of fibre, but to several components within the fibre. GS

2324

Lozano-de-Gonzalez (PG), Barrett (DM), Wrolstad (RE) and Durst (RW). **Enzymatic browning inhibited in fresh and dried apple rings by pineapple juice.** *Journal of Food Science* 58(2); 1993; 399-404

Sliced apple rings were treated with water (control), canned pineapple juice, frozen pineapple juice, ion-exchanged pineapple juice, frozen orange juice, ascorbic acid, a commercial antibrowning preparation or sodium bisulphite. The rings were either left exposed to air, vacuum packaged, or dehydrated. Browning was measured colorimetrically and by visual examination over extended periods of time. Pineapple juice was an effective browning inhibitor in both fresh and dried apples. Pineapple juice was fractionated using various size and charge separation procedures. All fractions inhibited enzymatic browning of crude apple extracts by at least 26%. Results indicate that the inhibitor is a neutral compound of low mol. wt. AA

2325

Bhalla (TC) and Joshi (M). **Production of cellulase and xylanase by *Trichoderma viride* and *Aspergillus* spp. on apple pomace.** *Indian Journal of Microbiology* 33(4); 1993; 253-255

Production of cellulase and xylanase by *Aspergillus* spp. and *Trichoderma viride* on dried, and pectin extracted apple pomace was studied under solid and liquid state fermentation conditions. Max. production of cellulase (5.0 units) and xylanase (4.2 units)

was obtained by *T. viride* and *A. niger* respectively on dried apple pomace. AA

## Apricots

2326

Pretel (MT), Serrano (M), Martinez (G), Riquelme (F) and Romojaro (F). **Influence of films of different permeability on ethylene synthesis and ripening of MA-packaged apricots.** *Lebensmittel-Wissenschaft und -Technologie* 26(1); 1993; 8-13

The storage of apricot (*Prunus armeniaca*) at 10°C, wrapped in 3 plastic films of differing degrees of permeability to O<sub>2</sub> and CO<sub>2</sub> was studied. The metabolism of the fruit itself modifies the gaseous composition below the film. This reaches an equilibrium after 4 to 6 days, with final O<sub>2</sub> and CO<sub>2</sub> concn. depending on both the permeability of the film used and fruit respiration activity. In all cases ethylene production was inhibited by more than 75%, with the highest inhibition produced in the films of least permeability. This inhibition of ethylene synthesis was produced both at the ACC-synthase level and at the ethylene forming enzyme level. The variation of the atm. surrounding the fruit was shown to retard softening and preserve the sensory characteristics in optimum condition for consumption during longer periods than would be the case in an unaltered atm. AA

## Bael fruit

2327

Pal (PK), Bhattacharya (DK) and Ghosh (S). **Chemical examination of the seed of *Aegle Marmelos* (Bael fruit) and its medicinal importance.** *Journal of the Oil Technologists Association of India* 25(3); 1993; 55-59

Bael seed contains 40.7% oil, fatty acids components palmitic (22.7%), stearic (3.7%), oleic (31.2%), linoleic (22.6%) and linolenic (19.6%). The oil carries a number of alkaloids in the unsaponifiable portion. The oil showed beneficial effect in the regeneration of two types of tumor. AA



2328

Bhavanl Sanker (K) and Madhava Rao (NN). **Nutritional investigations in Nendran banana fruit and dry matter yield.** *Madras Agricultural Journal* 80(1); 1993; 17-18

Effect of 3 levels of N(50, 100 and 150 g/plant) and 3 levels of P<sub>2</sub>O<sub>5</sub> (15, 30 and 45 g/plant) with a constant dose of 300 g/plant of K on the dry matter and fruit yield of banana cv. Nendran was investigated at Tamil Nadu Agricultural Univ., Coimbatore, India. Significantly good bunch wt. was recorded under 100 g N and 15 g P<sub>2</sub>O<sub>5</sub> plant while the application of 100 g N and 30 g P<sub>2</sub>O<sub>5</sub>/plant recorded the highest dry matter production. AA

### Breadfruits

2329

Sankat (CK) and Maharaj (R). **Refrigerated storage of the breadfruit and the effects of waxing, packaging and storage in water.** *Indian Food Packer* 47(3); 1993; 47-62

The post-harvest behaviour of breadfruit (*Artocarpus altilis*) in refrigerated storage at 16, 12 and 80°C and under ambient (28°C) conditions was studied. Four treatments were used viz. (i) normal air storage (control), (ii) storage of individual fruits in water (iii) packaging in polyethylene bags and (iv) waxing. Under ambient conditions air stored fruits ripened rapidly showing considerable changes and were unacceptable by the 4th day. Fruits stored in water showed delay in ripening, increase in wt. and vol. and a rapid decline in pH with off odour developed by 5th day. Waxing was the best in extending the shelf-life followed by packaging. GS

### Grapes

2330

Sharma (KS), Sharma (PC) and Thakur (KS). **Evaluation of some grape cultivars for processing grown under dry temperature climatic conditions of Himachal Pradesh.** *Indian Food Packer* 47(5); 1993; 5-8

6 exotic (*Vitis vinifera*) and a local (*labrusca* group or its hybrids with *vinifera*) grape cv. grown under dry temp. conditions of Kinnaur district, Himachal Pradesh, India, were assessed for their suitability for raisin and juice quality based on their physico-chemical and sensory parameters. Raisins from Thomson seedless had higher sugar content, sugar acid ratio and % raisins recovery than that from Anab-e-shahi and Malaga. Thompson seedless raisins were the most acceptable due to better sugar: acid blend/flavour, bright golden yellow colour and soft-texture. Thompson seedless had highest % juice recovery followed by Anab-e-Shahi and the lowest was Chholtu Red. TSS was highest in Thompson seedless var. followed by Chholtu Red and lowest in Anab-e-Shahi. Thompson seedless var. was found best suited for the production of quality raisin and juice followed by Malaga and Anab-e-Shahi. GS

### Mangoes

2331

Khan (AA) and Robinson (DS). **Purification of an anionic peroxidase isoenzyme from mango (*Mangifera indica* L. var. *Chaunsa*).** *Food Chemistry* 46(1); 1993; 61-64

A mango anionic peroxidase isoenzyme (A1) was purified to homogeneity by salt fractionation, gel filtration and ion-exchange chromatography. A1 with a mol. wt. of 40,000 approx. was free from contaminating proteins and other isoperoxidases and its amino acid residues contained glycine, serine and glutamic acid (about 48% of the protein moiety). SD

2332

Yahia (EM) and Vazquez-Moreno (L). **Responses of mango to insecticidal oxygen and carbon dioxide atmospheres.** *Lebensmittel-Wissenschaft und -Technologie* 26(1); 1993; 42-48

The tolerance and responses of mango (*Mangifera indica* L. var. Keitt) fruits to a modified atm. (MA) of 0.03 to 0.26% O<sub>2</sub> and 72 to 82% CO<sub>2</sub> (balance N<sub>2</sub>) for 0 to 4 days at 20°C, and to a controlled atm. (CA) of 2% O<sub>2</sub> + 50%



CO<sub>2</sub> (balance N<sub>2</sub>) for 0 to 5 days at 20°C, were evaluated. MA and CA increased the activity of ATP:phosphofructokinase, alcohol dehydrogenase, and pyruvate decarboxylase, but did not affect the activity of pyruvate kinase. MA decreased the activity of PPI:phosphofructokinase. Although the atm. used caused changes in the activity of some glycolytic enzymes, there was no indication of any injury and fruits ripened normally. Sensory evaluation did not indicate the presence of off-odours and off-flavours. This work indicates a potential application of MA/CA for post-harvest insect control in mango fruits. AA

## Oranges

2333

Ladaniya (MS) and Naqvi (SAMH). **Post-harvest handling of Nagpur mandarin.** *Indian Horticulture* 38(2); 1993; 24-29

Post-harvest handling of orange fruit viz., orchard management, fruit maturity and harvest, packing-house operations, (degreening of fruit) packing-line operations (sorting), washing, (water elimination, waxing, drying, size grading, packing, pre-cooling), handling and transport are described. SRA

## Papayas

2334

Arjunan (A), Balakrishnan (K), Natarajaratnam (N) and Rajendran (C). **Non-destructive method of measuring volume and weight of papaya fruit.** *Madras Agricultural Journal* 80(1); 1993; 21-23

An attempt was made to predict vol. and wt. of papaya using physical parameters in simple linear regression,  $Y = a + bx$ . The fruit vol. (Y) can be predicted through by fruit length (X), ( $Y = -1167.29 + 147.38 x$ ;  $r = 0.9627^{**}$ ), circumference (C) ( $Y = -1091.99 + 59.21 c$ ,  $r = 0.9433^{**}$ ) and also by the product of height (X) an circumference (C) ( $Y = -213.0 + 2.01 (x \times c)$ ;  $r = 0.9858^{**}$ ). The fruit wt. (Y) can also be predicted both by height (X) ( $Y = -1170.43 + 151.09 x$ ;  $r = 0.9402^{**}$ ) and product of  $X \times C$  ( $Y = -191.61 + 2.06 (x \times c)$ ;  $r = 0.9873^{**}$ ). This study will be helpful to measure the vol. and

wt. of the fruit *in situ* without destroying the fruit. AA

2335

Camara (MM), Diez (C) and Torija (ME). **Changes during ripening of papaya fruit in different storage systems.** *Food Chemistry* 46(1); 1993; 81-84

Water content, pH, °Brix, acidity, sugar content, neutral detergent fibre, proteins and minerals were determined in *Carica papaya* solo grown in Canary islands, during 1 month under different conditions (room temp. 25°C), domestic refrigerator 10°C and control chamber 12°C, 22% H<sub>2</sub>O. Data analysed by analysis of variance, correlation and principal component analyses indicated significant changes in composition in the fruits stored in a domestic refrigerator (10°C), and no significant effects between the two refrigeration storage conditions applied. The optimum storage temp. for papaya fruit can be 8-12°C and not < 7°C in order to avoid chilling injury. This also shows that pH and °Brix values are closely related to number of storage days and can be considered as indices of the ripening of papaya fruit. SD

## Pears

2336

Bolin (HR) and Huxsoll (CC). **Partial drying of cut pears to improve freeze/thaw texture.** *Journal of Food Science* 58(2); 1993; 357-360

Study was conducted to determine whether partial drying before freezing provides frozen pears with good texture upon thawing, without adversely affecting colour and flavour qualities. Bartlett pear quarters concentrated to 50% wt. loss by immersion in a 60°Brix, 60°C, sucrose solution maintained good colour and texture upon freezing and thawing. Partial drying was an effective pretreatment for improving freeze/thaw texture of cut pears. Conc. to 50% wt. reduction was needed to obtain satisfactory texture in frozen/thawed products. Colour and texture retention were better in osmotically conc. products than in hot-air dried products. Combinations of osmotic concn. and hot-air drying could be used if osmotic concn. was used for the first



35% wt. reduction. Cut pears may be pretreated by partial concn. to make high quality frozen products, which may lead to a new commercial use of pears in value-added further-processed foods. GS

## Quince

2337

Manuel Sa (M) and Sereno (AM). **Effect of temperature on sorption isotherms and heats of sorption of quince jam.** *International Journal of Food Science and Technology* 28(3); 1993; 241-248

The water sorption isotherms of two different brands of 'marmelada' quince jam at different temp. were determined experimentally and the parameters for the GAB estimated. Results obtained showed that the typical high sugar content of these products leads to an inversion of the usual temp.-dependence of water sorption isotherms for values of  $a_w$  above 0.6. This confirmed a behaviour already reported by other authors for high sugar products (e.g. dried fruits). From the data obtained for each brand of Portuguese 'marmelada' at different temp. it was also possible to estimate net isosteric heats of sorption and their dependence on moisture content. AA

## Strawberries

2338

Ponappa (T), Scheerens (JC) and Miller (AR). **Vacuum infiltration of polyamines increases firmness of strawberry slices under various storage conditions.** *Journal of Food Science* 58(2); 1993; 361-364

Strawberry slices were vacuum infiltrated with polyamines and changes in firmness during storage were determined. Spermine and spermidine at 10 mM or 100 mM significantly increased firmness, whereas putrescine was not as effective at increasing firmness, whereas putrescine was not as effective at increasing firmness of slices stored at 1°C. The firming effect of the polyamines was similar to that of  $\text{CaCl}_2$ , and may have been due to their ability to bind to cell walls and membranes. In ripe receptacles of various cvs which differed in firmness, putrescine (12-38 nmol/g fresh wt.)

and spermidine (19-33 nmol/g fresh wt.) were the predominant polyamines, while only low levels of spermine (< 10 nmol/g fresh wt.) were present. There was no discernible relationship between endogenous polyamine levels and fresh fruit firmness for the cvs studied. AA

## CONFECTIONERY, STARCH AND SUGAR

### Starch

2339

Sakiyama (T), Han (S), Kincal (NS) and Yano (T). **Intrinsic thermal conductivity of starch: A model-independent determination.** *Journal of Food Science* 58(2); 1993; 413-415, 425

Effective thermal conductivities of two-phase mixtures of potato or soluble starch granules with pure liquids or aqueous solutions (thermal conductivities in the range 0.169 - 0.602  $\text{W.m}^{-1}.\text{K}^{-1}$ ) were measured at 18.5 plus or minus 2.2°C using the steady state method. Measured values were compared with the thermal conductivities of the liquids and the results indicated a range of 0.38 - 0.40  $\text{W.m}^{-1}.\text{K}^{-1}$  for intrinsic thermal conductivity. Similar measurements, at temp. up to 50°C for soluble starch (to assess the temp. dependence of the intrinsic thermal conductivity) indicated no significant change over the range of temp. studied for mixtures with pure liquids. AA

2340

Lelievre (J). **Starch functionality and applications.** *Food Science and Technology Today* 6(4); 1992; 234-236

Discusses briefly the factors that influence the functional behaviour of starch such as variety, physical form, physical modification, cross-linking, oxidation, hydrolysis and substitution. The factors that determine the characteristics of food products, such as pH, concn. of starch, temp.-time, shear conditions, ingredients which are based on the functionality of gelatinised starch. GS

2341

Noel (T), Ring (S) and Whittam (M). **The structure and gelatinisation of starch.** *Food*



Reviews recent research on the structure of the starch polysaccharides, thermal transitions and interactions of the starch polysaccharides which occur during processing their involvement in gelatinisation; and preparation of a range of starch solids with useful microstructures through melting, crystallisation, plasticisation and vitrification of starch. 20 references. GS

## Sugars

2342

Bhatt (S). **Separation of fructose from carbohydrate mixtures. II. Chromatographic methods.** *Indian Sugar* 43(8); 1993; 615-620

Various chromatographic methods specially the ion-exchange method incorporating the theory, mechanism and factors involved in the separation of glucose and fructose is reviewed. Aspects include chromatography with inorganic absorbents (zeolites, basic alumina), chromatography with ion-exchange resins. SRA

## BAKERY PRODUCTS

2343

Machida (H), Yoshikoshi (M) and Miuro (M). **Current emulsifier technology in the Japanese baking industry.** *Cereal Foods World* 38(8); 1993; 559, 561, 562

The emulsifier technology involving high hydrophilic-lipophilic balance (HLB) sucrose fatty acid ester (SE) and glycerol monostearate (GMS) which acts both as emulsifiers and texture improvers used in the Japanese bakery industry is discussed in this article. CSA

2344

Kininori (T) and Nishiyama (J). **Recent advances in dough improvement with ascorbic acid and its derivatives.** *Cereal Foods World* 38(8); 1993; 554-556, 558, 559

The effects of L-ascorbic acid (AA) derivatives on dough are compared in this article. L-ascorbic acid 2-phosphate (AA-2p) and L-ascorbic acid 2-glucoside (AA-2G) were found to demonstrate the improving effect due to the action of the endogenous hydrolysing enzymes in flour. L-ascorbic acid 6-palmitate (AA-6Pa) investigated due to its emulsifying activity in dough lacked the oxidative effect on dough.  $\alpha$ -Glucosidases hydrolyze AA-2G but  $\alpha$ -glucosidases from yeast do not. The rate-controlled effect of AA-2G discussed suggests that it could be used as a replacement for bromate. CSA

2345

Chavan (JK) and Kadam (SS). **Nutrition enrichment of bakery products by supplementation with non-wheat flours.** *CRC Critical Reviews in Food Science and Nutrition* 33(3); 1993; 189-226

This article presents updated information on enrichment of bakery products using non-wheat flours and dietary fibre. Aspects covered are, wheat<sup>o</sup>milling (types of wheat, milling system, flour extraction, flour grades, flour proteins and baking quality, composition of flours), nutritional composition of bakery products (breads, biscuits, cookies and crackers, cakes, doughnuts), nutritional improvement by supplementation (breads-soybean, peanuts, other oilseeds, beans, non-wheat cereals, other sources, high-fiber bread; cookies, biscuits and crackers-soybean, peanut, *Phaseolus* beans, other legumes and oilseeds, non-wheat cereals and cakes and doughnuts). 204 references. SRA

## Bread

2346

Boyacioglu (D), Hettiarachchy (NS) and D'Appolonia (BL). **Additives affect deoxynivalenol (vomitoxin) flour during breadbaking.** *Journal of Food Science* 58(2); 1993; 416-418

The effects of oxidizing (potassium bromate and L-ascorbic acid) and reducing (sodium bisulphite and L-cysteine) agents, and



ammonium phosphate, at varying levels, on deoxynivalenol (DON; vomitoxin:3,7,15-trihydroxy-12,13-epoxytrichothec-9 en-8 one) in whole wheat flour were investigated during breadmaking. Baking of flour containing 3.13 µg/g DON brought about 7.0% toxin reduction in bread. Sodium bisulphite (25 and 50 µg/g) and L-cysteine (10, 40 and 90 µg/g) and ammonium phosphate (1,000 µg/g) were moderately effective in reducing DON level in bread (38.0 to 46.0%). Potassium bromate (25 and 75 µg/g) and L-ascorbic acid (50 µg/g) had no effect. AA

2347

Martinez-Anaya (MA), Pitarch (B) and Benedito de Barber (C). **Chemometrics assess quality of breadmaking starters.** *Journal of Food Science* 58(2); 1993; 419-425

Chemometric techniques were used to evaluate 15 wheat doughs containing different starter cultures to establish quality indexes based on objective measures. Correlations were determined among microbial starters, consumer acceptance and analytical variables, and variables necessary for quality assessment were reduced. In stepwise discriminant analysis 6 variables were significant ( $p < 0.95$ ) and used in discriminant functions. Dendograms showed similarities among cases. Strong correlations were found between sensory scores and some fermentative, biochemical and physical measures. The same variables were significant in formation of clusters by K-means clustering analysis. In factor analysis, the first 3 factors, accounting for 70% of variability, related to the same variables. Relationships between overall acceptance and other parameters explained differences in sensory evaluation. AA

2348

Czuchajowska (Z) and Pomeranz (Y). **Gas formation and gas retention. I. The system and methodology.** *Cereal Foods World* 38(7); 1993; 499-503

A combination of the rheofermentometer and an automated bread machine is used to mix a complete dough for subsequent evaluation of gas formation and retention and proof height in the rheofermentometer. The record from the

rheofermentometer can provide useful information about flour and/or dough systems, based on measurements of dough rise, gas formation and gas retention. The conclusions derived from the rheofermentometer plots were confirmed experimentally by baking a dough in the bread machine and by the AACC straight dough method. The use of the system to assess the effects of flour composition and properties and of dough mixing and fermentation schedules on bread quality was evaluated. CSA

2349

Czuchajowska (Z) and Pomeranz (Y). **Gas formation and gas retention. II. Role of vital gluten during baking of bread from low-protein or fiber-enriched flour.** *Cereal Foods World* 38(7); 1993; 504-507, 510-511

Dough rise, gas formation, and gas retention were examined as affected by the addition of commercial vital gluten to a low-protein soft wheat flour or to a high-protein hard wheat flour in which 10% flour was replaced by wheat bran. Dry or wet gluten was added to increase the protein content of a low-protein flour by 3-5%. The form (dry or wet) and especially the amount of added gluten influenced dough rise, gas formation, and gas retention, which were continuously recorded during fermentation by the rheofermentometer. The col. of dough under constraint (by a fixed wt.) rose by 7-10% per 1% increase in gluten protein during fermentation for a specific high-quality gluten, depending on the form of the added gluten. When high-protein flour was enriched by dietary fiber (replacement mode), dough rise was impaired as a result of dilution of functional protein. However, it was possible to compensate, to various degrees, for the vol. decrease when the dough was supplemented by high-quality gluten and baked in a bread-making machine or baked according to the AACC straight-dough method (100 g of flour). AA

## Cakes

2350

Pateras (IMC) and Rosenthal (AJ). **Effects of sucrose replacement by polydextrose on the mechanism of structure formation in high**



Differential thermograms of conc. model systems containing sucrose, polydextrose, wheat flour and egg white were produced between 7 and 135°C. Both sugar and polydextrose raise the egg protein denaturation temp. to a similar extent. Polydextrose raises the starch gelatinization temp. more than sucrose. When incorporated into high ratio cake batters as a sucrose replacer, polydextrose raises the starch gelatinization temp. to such a degree that it no longer coincides with protein denaturation, as occurs in conventional all sugar cakes. It is proposed that differences in the texture of the two cakes are due to these thermal events and their influence on structure creation. AA

### Chapathies

2351

Syed (HM), Rath (SD), More (DR) and Yasmin (HZ). **Studies on improving the chapathi quality.** *Indian Miller* 24(2); 1993; 25-30

Chapathis were prepared using HD-2189, N-59 and CC-464 wheat var. grown at Central farm of Marathwada Agricultural University, Parbani, India. The dough was allowed to ferment for 2, 4 and 8 h with and without lactic acid. (i) 0.5% lactic acid of 88% strength, and (ii) 0.5% yeast, 2% lactic acid + 0.5 yeast in dough were used. Chapathis were tested for consumer acceptance. Wheat N-59 chapathis were superior compared to HD 2189 and CC 464. Acidified (5% lactic acid) and/or yeasted for 2-4 h, chapathis showed considerable improvement in colour, texture and shelf-life. SRA

### MILK AND DAIRY PRODUCTS

2352

Grover (S), Batish (VK) and Tatini (SR). **Emerging pathogens of concern to dairy industry and their rapid detection.** *Indian Dairyman* 45(8); 1993; 343-348

Immunocapture method is recommended as a rapid screening tool to detect *Escherichia coli*, *Salmonellae* and *Listeria monocytogenes* and release of finished dairy and food products. The method is based on a sound statistical sampling plan and assures consumer safety. GS

2353

Patel (RK). **Present status and promise of dairying in India.** *Indian Dairyman* 45(7); 1993; 276-308

India occupies the second largest place in the world in the production of milk (10% of the world milk production). However the per capita availability of milk is very low due to increasing Indian population. The investment on dairying in various five year plans, growth rate of breedable cow and buffalo population productivity of milk animals; milk yield per animal; milk production in different regions; annual growth rate in milk production; availability and demand for milk; consumption pattern in different states and the need for better research, education and extension services in Indian dairying are covered. GS

2354

Dinesh (AY) and Shankar (PA). **Purification and characterization of proteinases from psychrotrophic *Vibrio* sp. of dairy origin.** *Indian Journal of Dairy Science* 46(6); 1993; 260-265

Psychrotrophic *Vibrio* isoaltes (45) obtained from milk, milk products and dairy environmental samples were screened and out of these 41 silates possessed proteolytic activity. Strain S<sub>1</sub> which produced the max. proteolytic activity was grown in casein-lactose mineral medium for 60 h at 30°C. The cell free supernatant was fractionated to obtain two purified proteinase fractions. One fraction (P1S2) had optima at pH 7.6 and 45°C, while the other (P3S1) had optima at pH 9.4 and 37°C. The latter fraction was designated as alkaline proteinase, while former as neutral proteinase. Both the enzyme fractions were not sensitive to EDTA but were partially heat stable after heating to 63°C for 30 min (batch pasteurisation) and completely at 100°C for 10 min. AA



2355

Harjinder Singh and Creamer (LK). **In vitro digestibility of whey protein/k-casein complexes isolated from heated concentrated milk.** *Journal of Food Science* 58(2); 1993; 299-302, 306

The disulphide-linked complex of *k*-casein and whey proteins that forms when concentrated milk is heated was isolated by centrifugation and column chromatography on Sephacryl S-1000. The rate of hydrolysis of  $\beta$ -lactoglobulin and *k*-casein in the complex and the reduced and carboxymethylated components of the complex were measured by polyacrylamide gel electrophoresis. The rates of hydrolysis at pH 2.0 (pepsin) and pH 8.0 (trypsin and chymotrypsin) were similar for *k*-casein in the complex and its reduced form.  $\beta$ -Lactoglobulin hydrolysis was faster for the reduced complex than for the complex which was much faster than for the native protein for all 3 enzymes. The results suggest that heating milk increases the digestibility of whey proteins, despite the formation of large protein complexes between the whey proteins and *k*-casein. AA

2356

Ghatak (PK). **Detection of milk from different species.** *Indian Dairyman* 45(5); 1993; 203-205

Outlines the 3 groups viz., serological, chemical and physical methods to detect adulteration of milk by that of other sp. The serological method is quick and needs less costly equipment. GS

2357

Rama Murthy (MK) and Surendra Nath (B). **Density (or specific gravity) of milk and its uses in dairy industry.** *Indian Dairyman* 45(6); 1993; 241-246

Density, sp. gr. values of cow and buffalo milks at various temp. and the method of obtaining them at different temp. using tables are given. GS

2358

Kornacki (JL) and Marth (EH). **Thermal inactivation of *Salmonella senftenberg* and *Micrococcus freudenreichii* in retentates from ultrafiltered milks.** *Lebensmittel-Wissenschaft und -Technologie* 26(1); 1993; 21-27

Heat resistance of *Salmonella senftenberg* 775W and *Micrococcus freudenreichii* MS66 in unconcentrated milks and in retentates from ultrafiltration (and sometimes diafiltration) of the same lots of milk was determined. Age (< 28-h-old) of either culture grown in skim milk had little effect on heat resistance of the bacterium when tested in skim milk at 66 and 62°C (D-values of 0.35 plus or minus 0.05 for *S. senftenberg* and 2.1 plus or minus 0.4 min for *M. freudenreichii* respectively). The z-values for *S. senftenberg* were 8.0, 7.9, 6.7 and 7.3°C, when heating in skim milk, a 4X retentate made from skim milk, whole milk and a 4X retentate (diafiltered) made from whole milk, respectively. The z-values for *M. freudenreichii* were 6.3 and 6.8°C when heating was in skim milk and a 5.7X diafiltered retentate made from skim milk, respectively. The D-values for *M. freudenreichii* were 1.8, 0.28 and 0.059 min at 63.5, 67.5 and 73°C respectively, when heating was in whole milk. Comparable values were 1.9, 0.23 and 0.59 min when heating was in a 3X retentate made from whole milk. The D-values for *M. freudenreichii* were 3.5 and 5.6 min, when heating at 62°C was in whole milk and in evaporated whole milk, respectively. Osmolality of retentates changes very little as total solids increased. The osmolality, in milliosmol/kg, was 140 for a diafiltered 5.7X retentate (24.7 g/100 g total solids) made from skim milk, 258 for skim milk (9.0 g/100 g total solids), 229 for a 4X retentate (25.7 g/100 g total solids) made from whole milk, 242 for whole milk (11.3 g/100g total solids) and 676 for evaporated whole milk (24.9 g/100g total solids). Thermal protection of bacteria in milks and concentrate milks appears to be influenced more by their content of low mol. wt. solutes than by total solids. AA



## Milk products

2359

Sarkar (S). **Cultured milk products for weaned and lactose-intolerant infants.** *Indian Dairyman* 45(5); 1993; 197-202

Because of nutritional and therapeutic properties cultured milk products like yoghurt, acidophilus milk, bifidus milk, Bulgarian milk, kefir are supplemented to infant foods. They are also used in developing cultured weaning foods like malysh, malyutka, baldyrgan, pastolakt, khishk, tarhana, kushuk, and yoghurt for feeding healthy, lactose intolerant infants. Various food grade enzymes from *Kluyveromyces lactis*, *Kl. fragilis*, *Aspergillus niger*, *Asp. oryzae*, *Lactobacillus brevis*, *Lact. fermenti*, *Lact. salivarius*, *Saccharomyces lactis*, *Sacch. fragilis* are used to prepare cultured milk products low in lactose content. Dahi, yoghurt, progurt, etc with increased  $\beta$ -galactosidase and lactase activity and reduced lactose content are suitable for healthy as well as lactose intolerant infants. GS

2360

Brar (S) and Aparnathi (KD). **Hydrolysed lactose: manufacture, properties and its applications in the food industry.** *Indian Food Packer* 47(5); 1993; 45-51

Outlines limitations of use of lactose, methods of hydrolysis of lactose, benefits of lactose hydrolysis (reduced lactose content, preventing lactose crystallization, increased solubility, increased sweetness, more universally fermentable sugar, increased level of reduced sugar, and lower mol. wt.); and applications of lactose hydrolysis resulting in modified dairy products (fluid milk, cheddar cheese, yoghurt, cottage cheese, condensed/evaporated milk) and sweeteners/preservative for ice cream, canned fruits, chewing gum, bakery products and fermenting beer and wine. GS

2361

Salji (J). **Acidophilus milk products: foods with a third dimension.** *Food Science and Technology Today* 6(3); 1992; 142-147

Briefly covers the following aspects: *Lactobacillus acidophilus*; manufacturing methods for acidophilus milk, acidophilus-yeast milk, acidophilus buttermilk, acidophilus-yoghurt products, ultra products, yakult products and sweet acidophilus milk, sensory qualities of acidophilus milk products, nutritional qualities of acidophilus milk products and therapeutic properties (improved digestibility, enhanced growth, lactose tolerance, antimicrobial action, anticarcinogenic effect, antihololnesterolemic life) and health benefits of acidophilus milk. BV

## Butter

2362

Verma (NK), Singh (S) and Rawat (BS). **Effect of batch size on fat loss in table butter manufacturing.** *Beverage and Food World* 20(1); 1993; 33, 34

A pilot level study was conducted over a period of 1 yr in a selected dairy plant on fat loss and causes of variations analysed statistically. It was estimated that during reception, separation and butter manufacturing from cream, total losses amounted to 399.12, 695.34 and 181.23 kg respectively. The contribution of these losses in table butter manufacturing was 48.71 kg in milk reception and 175.44 kg in milk separation. Hence the total losses in table butter manufacturing were of the order of 405.38 which amounts to 4.03% of total fat intake. Losses were higher in summer than other months (winter). SRA

## Cheese

2363

Lavanchy (P), Berodier (F), Zannoni (M), Noel (Y), Adamo (C), Squella (J), Herrero (L). **Sensory evaluation of the texture of hard and semi-hard cheeses. A collaborative study.** *Lebensmittel-Wissenschaft und -Technologie* 26(1); 1993; 59-68

A group for the sensory analysis of cheese was formed as part of the FLAIR COST 902 programme in order to harmonize the training of the tasting panel and to develop a common method for characterizing hard and semi-hard



cheese. After placing the importance of cheese texture between its aspect and flavour and having noted that no method described in the literature was directly applicable, the group agreed on a method to appreciate the texture of cheese. The characteristics of surface, mechanical, geometrical and other kinaesthetic and oral sensations were studied. Other reference foods besides cheese, e.g. an apple or a biscuit or the inside of a banana skin, were used to clarify perceptions as well as their intensities. Also, in order to study the relationship between the instrumental and sensory analysis - the principal object of the FLAIR COST project - the mechanical characteristics were clarified by physical and sensory definitions as well as by an original assessment technique. The magnitude of perception is measured on a scale of 7, 3 of which are set by a standard reference product known in all European countries. Semantic and socio-cultural difficulties were taken into consideration. This guide was originally prepared in French, however, translations into Italian, Spanish, German and English will be made in the future as part of the FLAIR COST project. They are placed under the responsibility of the various authors of this method. AA

#### **Cheddar cheese**

2364

Jack (FR), Paterson (A) and Piggott (JR). **Relationships between rheology and composition of Cheddar cheeses and texture as perceived by consumers.** *International Journal of Food Science and Technology* 28(3); 1993; 293-302

Rheological and composition measurements used as industrial indices of textural quality in Cheddar cheeses were related to sensory data, obtained by free choice profiling using an untrained panel. Procrustes analysis of compositional and instrumental data on a group of 19 Cheddars displaying a range of textural characteristics showed certain important Instron variables and compositional variables that discriminated between samples in terms of textural characteristics. However, neither analysis discriminated between the samples in the same way as the consumers perceived texture. The second dimension of the

sensory data discriminated between samples in terms of mouthfeel, or tertiary textural properties, correlating with moisture content but not easily quantifiable using force-deformation analysis. Sensory dimension 3 related to perceived textural maturity. Composition parameters did not change significantly with maturity of texture, but measures of elasticity and cohesiveness did correlate significantly. AA

#### **Mozzarella cheese**

2365

Masud (T), Shah (MA) and Kausar (R). **Use of buffalo milk for preparation of Mozzarella cheese.** *Indian Journal of Dairy Science* 46(6); 1993; 266-268

Mozzarella cheese was prepared from buffalo milk using direct acidification technique. The av. cheese yield recorded was 19.65%. The cheese had higher fat contents (23.50%) than protein (20/15%) contents. Significant loss of total solids were recorded in whey. Fresh cheese had identical flavour, a linear decrease in organoleptic properties after 2 wk storage at 4°C. The cheese had satisfactory melting and fat leakage characteristics. This investigation provides a baseline for making Mozzarella cheese from buffalo milk at cottage scale, which can be used in the baking industry for pizza making. SRA

#### **Curds**

2366

Misra (PR), Das (KL) and Roy (PK). **Bacteriological study of curd around Bhubaneswar.** *Indian Dairyman* 45(7); 1993; 309-310

50 curd samples collected locally in and around Bhubaneswar, India contained *Streptococcus pyogenes* 10%, *Staphylococcus* 24%, *E. coli* 28%, *Proteus* 10%, *Salmonella* 2%, *Shigella* 2%, *Diphtheroids* 20% and *Bacillus* spp. 4%. Bacterial load for each sample was found to be  $6 \times 10^6$  cfu/g to  $10 \times 10^6$  cfu/g. The types of bacteria present and the bacterial load indicate that the curd sold in the city to be most unhygienic for human consumption. AA



## Ghee

2367

Sarkar (S), Kuila (RK) and Misra (AK). **Production of ghee with enhanced flavour by the dairy industry.** *Indian Dairyman* 45(8); 1993; 337-342

The various techniques using starter cultures, starter conc., and synthetic flavourings that the dairy industries can adopt to produce ghee with enhanced flavour are discussed. During ripening the constituents of cream and butter viz. lactose, glucose, citrate, etc. are converted into various flavouring compounds like free fatty acids and carbonyls which impart flavour to ghee. The various constituents of butter aroma in the fat phase like skatole, indole and dimethyl sulphide passed into ghee either in their original or modified form on heating. The lactic acid formed during ripening, present in butter serum serve as a ghee flavour precursor. Presence of water soluble acids viz., acetic and butyric acid due to heat treatment also contribute towards its flavour. The typical flavour of ghee is due to the composite effect of various flavouring compounds viz., carbonyls, lactones, free fatty acid - SH groups, esters etc. *Streptococcus lactis* sub sp. diacetylactis DRC-1 at a level of 1% is optimum for the production of ghee with enhanced flavour. Clarification at 110-120°C is the best temp. GS

## Khoa

2368

Upadhyay (JB), Bhandania (AG), Christie (IS) and Shah (US). **Manufacture of khoa based sweets and other food products on scraped surface heat exchanger (SSHE) - an encouraging experience.** *Indian Dairyman* 45(6); 1993; 224-227

Suitability of scraped surface heat exchanger (SSHE) for the manufacture of certain khoa/milk based sweets like gajar (carrot) halwa, dudhi (bottle gourd) halwa, kheer, basundi and tomato ketchup was investigated standardizing the process line. Buffalo milk can be used in place of khoa for the preparation of certain sweets using this machine. SSHE is

easy to operate, requires low manpower and assures uniform quality with economy. GS

2369

Wadhwa (BK), Gandhi (DN) and Goyal (GK). **Enhancement in the shelf-life of khoa.** *Indian Food Packer* 47(5); 1993; 53-59

Shelf-life of khoa with antioxidants BHA and TBHQ and antimicrobial agent potassium sorbate (KS) stored at 30°C packaged in cellophane laminates was studied. 0.3% KS in khoa and vacuum packaging in cellophane laminates enhanced the shelf-life to 21 days as compared to 15 days in conventional packages. Vacuum packaging without preservative increases the shelf-life of khoa to 9 days as compared to 6 days without preservative and stored in conventional packages. GS

## Milk powder

2370

Savna (BH), Goyal (GK) and Joginder Singh. **Changes in physico-chemical properties of vacuum roller dried buffalo whole milk powder due to varied levels of vacuum, feed concentration and steam pressure.** *Beverage and Food World* 20(10); 1993; 20-23

The physical properties of whole milk powder samples prepared from 20 and 25% total solids (TS) buffalo milk at 25" and 27" of Hg vacuum and operated at 50 and 60 psig was studied. Results showed greater solubility index under 25" Hg vacuum than under 27" Hg. Feed concn. with higher vacuum of 27 Hg and more TS resulted in product with higher bulk density and greater dispersibility, but lower wettability. Greater TS and higher steam pressure gave larger size powder particles. Variation in vacuum level had no effect on particle size. Samples made under 25" Hg vacuum showed higher colour index, but lower sinkability. Variation in steam pressure had no effect on physical properties, but caused significant variation in chemical properties. Samples made under 25" Hg vacuum and with greater solids showed more moisture and less titratable acidity. 5-Hydroxymethyl furfural was more in samples made under 27" Hg vacuum, while 25" Hg vacuum resulted in more free fat. SRA



## Shrikhand

2371

Suryawanshi (SV), Lembhe (AF), Khedkar (CD) and Kauwar (HV). **Study to evolve a rapid method for Shrikhand manufacture.** *Indian Journal of Dairy Science* 46(6); 1993; 269-273

Results of the investigation showed that the total time required for preparation of Shrikhand could be reduced from 20 h to 6 h by reducing the curd setting time from 10-12 h to 4 h by employing 6% inoculum and accelerating the whey expulsion rate from 6-8 h to 2.5 - 2 h by heating dahi to 60 and 70°C for 10 min. SRA

## Wheys

### Whey proteins

2372

Das (KP) and Kinsella (JE). **Droplet size and coalescence stability of whey protein stabilized milkfat peanut oil emulsions.** *Journal of Food Science* 58(2); 1993; 439-444

Droplet diam. and the polydispersity of droplet size tended to decrease with increased proportion of peanut oil. Macromolecular additives affected droplet size. Xanthan gum or sodium carboxymethyl-cellulose (Na-CMC) produced smaller droplets than the controls, but the av. diam. was independent of the composition of the dispersed phase. At 50°C the coalescence stability of these emulsions qualitatively correlated with the initial droplet diam. Xanthan gum and Na-CMC, despite increasing continuous phase viscosity, gave lower stability than controls, primarily the result of flocculation of droplets due to depletion of the highly hydrophilic macromolecule from the intervening region between approaching droplets. At 25°C, stability increased as solid butter oil content of the dispersed phase increased. AA

## MEAT AND POULTRY

### Meat

2373

Tagliavini (J), Bolchi (A), Bracchi (PG) and Ottonello (S). **Sex determination on samples of bovine meat by polymerase chain reaction.** *Journal of Food Science* 58(2); 1993; 237-238, 244

The procedure based on the polymerase chain reaction (PCR) involves DNA extraction and the electrophoretic analysis of the amplification of bovine requiring about 5 h. Since samples of meat DNA as well as PCR products can be stored at -20°C for prolonged times, the analysis can conveniently be split into distinct steps. The procedure is rapid, accurate and based on established techniques. GS

2374

Park (YW) and Washington (AC). **Fatty acid composition of goat organ and muscle meat of alpine and nubian breeds.** *Journal of Food Science* 58(2); 1993; 245-248, 253

Fatty acid compositions of liver, heart, kidney, Longissimus dorsi (LD) and Biceps femoris (BF) of two goat breeds were evaluated using capillary GC. Lauric (C12:0) acid was absent from the liver and kidney. All organ samples had significantly ( $P < 0.01$ ) greater polyunsaturated fatty acids (PUFA) than the LD and BF muscles. The organs also contained significantly ( $P < 0.01$ ) higher saturated fatty acids (SFA) than the skeletal muscles, whereas the opposite trend occurred for the C18:1 contents. Levels of 14:0, 16:0, and 18:2 acids were related to breed, while those of 14:0, 18:0, 18:1, 18:2 and 20:4 acids were related to tissues. Goat muscles had higher PUFA:SFA ratio than those reported for beef, which may be important in human nutrition. AA

2375

Ajuyah (AO), Fenton (TW), Hardin (RT) and Sim (JS). **Measuring lipid oxidation volatiles in meats.** *Journal of Food Science* 58(2); 1993; 270-273, 277

A simple, practical, low cost total volatile trapping technique to monitor oxidative changes in meat during refrigerated storage (4°C) was developed and some of the products of lipid oxidation responsible for the



development of warmed-over flavour in chicken white and dark meat were identified and quantified. Hexanal was the most prominent and abundant individual volatile compound in both meat types throughout storage. After 5 days of refrigerated storage at 4°C, the white and dark meat from broilers fed the full-fat flax seed with mixed tocopherol and canthaxanthin diet had lower rancidity scores than the diet fed groups. GS

2376

Lopez (V) and Lindsay (RC). **Thermal stability of some metabolically conjugated potential precursors of flavour components in meat and milk.** *Journal of Food Science* 58(2); 1993; 292-294, 298

The thermal stability of selected aromatic metabolic conjugates (phenylphosphate (pp), phenylglucuronide (PG), naphthylglucuronide (NG) and naphthylsulphate (NS)) to provide information which help to improve understanding of flavour production during cooking and processing of meat and dairy products was determined. PP was less stable than the PG and NG and NS, especially under neutral (pH 6.8) and acidic conditions (pH 1.5). PP was completely degraded after 1.7 h at 100°C and after 0.3 h at 150°C at pH 6.8. The PG and NG and NS > conjugates were stable under neutral conditions (pH 6.8) requiring > 5 h for complete hydrolysis at 100°C, and after 0.3 h at 150°C at pH 6.8. GS

2377

Abu-Tarboush (HM) and Dawood (AA). **Cholesterol and fat contents of animal adipose tissues.** *Food Chemistry* 46(1); 1993; 89-93

Adipose tissues from camel, lamb and beef carcasses showed differences in total lipids and cholesterol contents. The av. lipids of 80.22% ranged from 71.25 to 92.17% and cholesterol from 135 to 184 mg/100 g. Cholesterol level in camel adipose tissues was lower than that of beef and lamb. Cholesterol concn. in adipose tissue of kidneys, being the highest, was hump, tail and subcutaneous fats. The differences in subcutaneous fat cholesterol levels between high and low energy feeds and castrated and non-castrated beef at similar ages were minor.

Some of the cholesterol values for beef adipose tissues exceed the literature values. SD

2378

Sundheim (G), Hagtvedt (T) and Dainty (R). **Resistance of meat associated staphylococci to a quarternary ammonium compound.** *Food Microbiology* 9(2); 1992; 161-167

Swab samples from meat cutting surfaces and other surfaces or equipments in meat and poultry processing plants were studied for microbial contamination. Of 191 isolates identified as staphylococci, 10 isolates (0.5%) showed min. inhibitory concn. values between 4.5 and 9 µg ml<sup>-1</sup>, 105 values of < 1 µg ml<sup>-1</sup> and the rest intermediate values of 70% were 2 or below. All 10 strains were among the non-speciated strains and gave 5 distinct biochemical profiles in the API STAPH-system. Serial subculturing of both resistant and sensitive strains in sublethal concn. of benzalkonium chloride led to increased resistance in both min. inhibitory concn. and standard suspension test. SRA

## Beef

2379

Decker (EA), Crum (AD), Shantha (NC) and Morrissey (PA). **Catalysis of lipid oxidation by iron from an insoluble fraction of beef diaphragm muscle.** *Journal of Food Science* 58(2); 1993; 233-236, 258

The effect of different endogenous Fe sources on the oxidative deterioration of muscle foods, was studied. The insoluble fraction of beef diaphragm muscle was capable of catalyzing lipid oxidation. Such oxidation was catalyzed by Fe released from the insoluble fraction. Fe associated with insoluble compounds contributed to increases in low mol. wt. Fe and lipid oxidation of muscle foods. GS

2380

Cooksey (K), Klein (BP), McKeith (FK) and Blaschek (HP). **Post-packaging pasteurization reduces *Clostridium perfringens* and other bacteria in precooked vacuum-packaged beef loin chunks.** *Journal of Food Science* 58(2); 1993; 239-241



Precooked beef loin chunks (BLC) were vacuum packaged after inoculation with *Cl. perfringens* vegetative cells or spores. Pasteurized and non-pasteurized BLC were stored at 4°C for upto 85 days. Pasteurization reduced populations of vegetative cells (VC) and VC from spores from day 0 to 85 on the surface and in the broth of the inoculated precooked BLC. The max. number of vegetative cells from spores (VCS) from the broth of pasteurized chunks was 0.28 log<sub>10</sub>/ml (at 7 days). In non-pasteurized BLC, the max. *Cl. perfringens* VCS population (3.93 log<sub>10</sub>/ml) from the broth was not as high as the max. number of VC (4.92 log<sub>10</sub>/ml). Enterotoxin was detected in broth samples from meat inoculated with vegetative cells and spores throughout the storage period. Pasteurization technique is effective in extending the shelf-life of precooked foods. GS

2381

Akinwunmi (I), Thompson (LD) and Ramsey (CB). **Marbling, fat trim and doneness effects on sensory attributes, cooking loss and composition of cooked beef steaks.** *Journal of Food Science* 58(2); 1993; 242-244

Results indicate steaks became tougher and less juicy with increased internal end-point temp. Steaks with a max. of 6 mm subcutaneous fat had greater cooking losses than those with a max. of 2 mm subcutaneous fat. Chemical composition of the steaks was affected by degree of marbling, subcutaneous fat trim level and internal endpoint temp. of cooked steaks. The amount of ash in the steaks was not affected by marbeling or fat trim level. Cholesterol content was not affected by degree of doneness. Cooking meat to a lesser degree of doneness can minimize cooking losses and preserve sensory quality of lean meats. GS

2382

Intarapichet (K-O) and Bailey (ME). **Volatile compounds produced by meat *Pseudomonas* grown on beef at refrigeration temperatures.** *ASEAN Food Journal* 8(1); 1993; 14-21

Seventy three pseudomonad isolates were recorded from spoiled commercial ground beef stored at 4°C for 14 days. These isolates included 27% flourescent pseudomonad and

73% non-flourescent pseudomonads. A representative isolate from *Pseudomonas fluorescens* and 3 isolates from non-flourescent *Pseudomonas* along with reference cultures were grown on sterile beef at 4°C for 14 days. Volatile compounds produced during microbial growth on beef were sulphur containing compounds including methanethiol, dimethylsulphide, dimethyl-disulphide, dimethyltrisulphide and methylthioacetate. SRA

2383

Hertzman (C), Olsson (U) and Tornberg (E). **The influence of high temperature, type of muscle and electrical stimulation on the course of rigor, ageing and tenderness of beef muscles.** *Meat Science* 35(1); 1993; 119-141

The course of *Rigor mortis* (rigor), ageing and tenderness was evaluated for 3 beef muscles: *M. biceps femoris* (BF), *M. semimembranosus* (SM) and *M. semitendinosus* (ST), when entering rigor at 15 and 37°C respectively, with and without electrical stimulation (ES/NS) (85v, 14Hz and 32s). Max. shortening and isometric tension were higher at 37°C and ES did not reduce rigor shortening. A high correlation between max. shortening and ATP-level at the onset of the shortening rapid phase was found ( $r = 0.77$ ). ES did not improve the tenderness of any of the 3 muscles, neither at 15 nor at 37°C, since none of those interactions was significant. SRA

2384

Grant (IR), Nixon (CR) and Patterson (MF). **Effect of low-dose irradiation of growth of and toxin production by *Staphylococcus aureus* and *Bacillus cereus* in roast beef and gravy.** *International Journal of Food Microbiology* 18(1); 1993; 25-36

Irradiation (2 kGy) caused significant reductions (3-4 log<sub>10</sub> cycles) in the number of *Staph. aureus* and *B. cereus* present on the beef and gravy samples. In the case of samples inoculated with 10<sup>2</sup> cells/g of either pathogen prior to irradiation the initial numbers were reduced below the detection limit of 10 cfu/g. When samples initially containing low levels (10<sup>2</sup>/g) of *Staph. aureus* were irradiated no



toxin was produced during subsequent storage at 15 or 22°C. Diarrhoeal toxin produced by *B. cereus* was detected after 2 days at 22°C, but not at 15°C. It can be concluded that low-dose irradiation improves the microbiological safety of roast beef and gravy. SRA

## Sheep

### Lamb

2385

Devine (CE), Graajhuis (AE), Muir (PD) and Chrystall (BB). **The effect of growth rate and ultimate pH on meat quality of lambs.** *Meat Science* 35(1); 1993; 63-77

The effect of 2 different growth rates viz: Romney lambs (n = 60) grown slowly for 67 g/day) and slaughtered at 14 months of age at target wt. of 18 kg, another group of ram lambs (n = 15) from the same genetic background grown rapidly for 162 g/day for 7 months and slaughtered at the same time and at similar carcass wt., on the tenderness of lamb loins was investigated. The effect of muscle ultimate pH on tenderness and sensory attributes were determined. The groups with the greatest stresses had the highest ultimate pH values measured on the *Longissimus dorsi*. The most tender meat was from animals with pH > 6.3. Shear force value increased from 8 kg F to 13 kg F. Further increase in pH, the shear force decreased from 13 kg F to 6-8 kg F. Differences in mean shear force for the two groups could be attributed to differences in their range of ultimate pH, than their age. The group with low/medium stress levels were least acceptable with regard to texture and tenderness. Flavour, juiciness, and aroma were relatively uniform across the whole ultimate pH spectrum. SRA

### Pork

2386

Wimmer (MP), Sebranek (JG) and McKeith (FK). **Washed mechanically separated pork as a surimi-like meat-product ingredient.** *Journal of Food Science* 58(2); 1993; 254-258

Mechanically separated pork (MSP) was washed using water or 1.5% salt sol., each at pH 5.5 and 6.5 to produce a surimi-like product for further processing. Composition and functionality of the washed product was evaluated and use in processed meat formulations was assessed. Washing treatments reduced fat content to < 1% but did not reduce Ca content of MSP. The salt sol. resulted in removal of heme pigments. Frankfurters manufactured with washed MSP showed little improvement over those with unwashed MSP for texture or water binding; therefore, applications may be limited. However, lipid oxidation of frankfurters containing washed MSP, as measured by TBA, was suppressed during storage. AA

2387

Monahan (FJ), Gray (JI), Asghar (A), Haug (A), Shi (B), Buckley (DJ), Morrissey (PA). **Effect of dietary lipid and vitamin E supplementation on free radical production and lipid oxidation in porcine muscle microsomal fractions.** *Food Chemistry* 46(1); 1993; 1-6

2388

Oliver (MA), Gispert (M) and Diestre (A). **The effects of breed and halothane sensitivity on pig meat quality.** *Meat Science* 35(1); 1993; 105-118

The results of this study show that stress sensitivity as an important factor affecting the inverse relationship between carcass quality and meat quality. The increase in the quality of the fresh pig meat and the production of dry-cured ham of high quality, the stress-resistant breeds showing relatively high levels of intramuscular fat could be used. BV

### Swine

2389

Seewald (MJ), Iaizzo (PA), Heisswolf (E) and Eichinger (HM). **Effect of meat quality and storage on the breakdown of adenosine triphosphate in muscle from swine.** *Meat Science* 35(1); 1993; 47-61

The pre-classification of the animal carcasses into 3 groups was based on monitoring pH and



electrical conductivity 40 min post mortem. PSE meat (pH less than or equal to 5.6 and conductance > 10 mS), intermediate quality (IQ) (pH greater than equal to 6.0 and conductance < 4 mS). Samples of the thoracic portion of the *Longissimus dorsi* muscle were obtained from 19 randomly selected German Landrace-Pertian crossbreed swine. Following different storage period and conditions (1 or 5 days at 4°C and 27 days at -18°C), the degree of adenosine triphosphate (ATP) metabolism and general meat quality were assessed. Samples from the pre-classified groups became less discernible following prolonged storage. In all animals, the ATP breakdown was similar, the major metabolites including inosine monophosphate ( $P < 0.0001$ ), hypoxanthine ( $P = 0.057$ ), adenosine monophosphate and inosine ( $P < 0.0001$ ). The degree of breakdown was dependent on the duration and temp. of storage. The muscular samples for IQ and NQ stored at -18°C for 27 days, were rated high for sensory qualities. SRA

## Products

### Meat

2390

Gregg (LL), Claus (JR), Hackney (CR) and Marriott (NG). **Low-fat, high added water bologna from massaged, minced batter.** *Journal of Food Science* 58(2); 1993; 259-264

Bolognas were manufactured to produce a high-fat (30% fat), 10% added water (AW) formulation and 3 low-fat treatments which contained 10% fat/30% AW. Lean and fat trim for the low-fat treatments were blended and minced before massaging intermittently (10 min on/20 min off) for 0, 2.5 and 5.0 h. Massaging did not affect pH or cook/chill losses but increased batter viscosity. Massaging generally increased purge accumulation, regardless of degree of vacuumization. Sensory and instrumental detn. indicated massaging up to 2.5 h increased ( $P < 0.05$ ) cohesiveness. In addition, particle definition was decreased. There were no differences ( $P > 0.05$ ) in hardness among low-fat treatments. Massaging resulted in low-fat products that were less cohesive, softer, and more juicy than high-fat bologna. AA

2391

Mittal (GS) and Barbut (S). **Effects of various cellulose gums on the quality parameters of low-fat breakfast sausages.** *Meat Science* 35(1); 1993; 93-103

Composition, textural, viscoelastic, hydration, colour and sensory attributes of regular (26% fat) and low-fat (13%) pork breakfast sausages with and without cellulose gums (2 types of carboxymethyl cellulose (CMC-I and -II) were investigated. The fat was replaced with water in low-fat products. In cooked low-fat sausages, the fat content decreased by 52-60%, and moisture content reduced by 61-65% of the initial values. The cooked high-fat products' composition showed an increase of about 6% fat and a decrease of 7% moisture due to cooking. MCC was more effective in retaining moisture compared to CMC. Product lightness was reduced due to both CMC and MCC. Gums have not affected fat content, water holding capacity, redness, yellowness, hardness, chewiness and gumminess. High-fat products were less elastic and easier to chew. Springiness was reduced by CMC-II and cohesiveness by other cellulose gums. AA

### Sausages

2392

Huang (C-C) and Lin (C-W). **Drying temperature and time affect quality of Chinese-style sausage inoculated with lactic acid bacteria.** *Journal of Food Science* 58(2); 1993; 249-253

*Lactobacillus plantarum*, *Streptococcus thermophilus* and a commercial culture (DS-66) were used as starter culture for manufacturing Chinese-style sausage. The influence of drying temp. and time on the growth of lactic acid bacteria (LAB) and on changes in quality were determined. After drying the sausage at 37 and 45°C for 12 h. the population of LAB had increased from an initial  $10^6$  CFU/g to  $10^8$  and  $10^7$  CFU/g respectively. The pH value was the lowest for the sausage dried at 37°C. Nitrite residuals decreased rapidly with increased drying time. Starter cultures increased the amino nitrogen level and suppressed ammonia nitrogen production. AA



## Poultry

### Chickens

2393

Ang (CYW) and Haung (YW). **Internal temperature and packaging system affect stability of cooked chicken leg patties during refrigerated storage.** *Journal of Food Science* 58(2); 1993; 265-269, 277

Internal end-point temp. (EPT), packaging system and storage time affected chemical stability and microbiological quality of chicken meat. Patties of broiler leg muscle were heated EPT to 60, 65, 70, 75, 80 or 85°C, packaged in polyethylene bags or vacuum skin packs and stored at 4°C up to 14 days. Microbial total plate counts were < 10 CFU/g at EPT 70°C; with negligible growth during 7 days storage. EPT and packing method did not affect initial thiobarbituric acid reactive substances (TBARS) but higher EPT accelerated the increases in TBARS values upon storage. Several volatiles including hexanal and pentanal increased with EPT and storage time. AA

2394

Uijttenboogaart (TG), Trziszka (TL) and Schreurs (FJG). **Cryoprotectant effects during short time frozen storage of chicken myofibrillar protein isolates.** *Journal of Food Science* 58(2); 1993; 274-277

The stabilization of chicken myofibrillar protein isolate (MPI) during frozen storage by the addition of cryoprotectants was studied. For 2-4 wk at -21°C, MPI was exposed to different freezing and thawing treatments and extent of effect of cryoprotectants for preventing denaturation of MPI was also determined. 2.8% sorbitol in combination with 4% starch was the best cryoprotectant. 2.8% sorbitol with 4% sucrose was also found to be effective. GS

2395

Sharma (DP) and Panda (PC). **Prestorage infusion of polyphosphates on certain quality characteristics of culled dressed**

**chicken.** *Beverage and Food World* 20(1); 1993; 28-29, 32

Four different phosphate infusions (tetra sodium pyrophosphate (TSPP) 5% sol. injected upto 2% of carcass wt. (T<sub>1</sub>), TSPP 5% sol. injected upto 5% of carcass wt. (T<sub>2</sub>) TSPP and NaCl (5% + 2.5%) sol. injected upto 2% of carcass wt. (T<sub>3</sub>), TSPP and NaCl (5% + 2.5%) sol. injected upto 5% of carcass wt. (T<sub>4</sub>)) were injected to determine the water holding capacity (WHC), pH, cooking loss and organoleptic quality. Results revealed that T<sub>4</sub> was most beneficial in improving WHC, pH, reducing cooking loss and improving organoleptic qualities. SRA

2396

Langston (SW), Altman (NS) and Hotchkiss (JH). **Within and between sample comparisons of Gompertz parameters for *Salmonella enteritidis* and aerobic plate counts in chicken stored in air and modified atmosphere.** *International Journal of Food Microbiology* 18(1); 1993; 43-52

Three independent samples and three sub samples of ground raw chicken meat were inoculated with *S. enteritidis* and packed in barrier films containing air or modified atm. (MA) of 75% CO<sub>2</sub>, 20% N<sub>2</sub> and 5% O<sub>2</sub>, and stored at 13 and 27°C for 120 h. Samples were quantitatively enumerated for aerobic plate counts (APC) and *S. enteritidis* (cfu/g). At 13°C, APC averaged 1.27 log units lower in the MA compared to air while *Salmonella* counts averaged 1.44 log units higher. At 27°C APC averaged 0.46 log units lower in the MA compared to air while *Salmonella* averaged 0.30 log units lower. Study suggests that empirically derived models (Gompertz) may be used to describe microbial growth in chicken. SRA

### Turkeys

2397

Ahn (DU), Ahuyah (A), Wolfe (FH) and Sim (JS). **Oxygen availability affects prooxidant catalyzed lipid oxidation of cooked turkey patties.** *Journal of Food Science* 58(2); 1993; 278-282, 291



The effect of catalysts (free ionic iron, hemoglobin and/or NaCl) on the lipid oxidation process in cooked turkey meat, stored, under conditions of variable O<sub>2</sub> availability was studied. With limited O<sub>2</sub> contact (cold vacuum-packaging) after cooking, the 2-thiobarbituric acid reactive substances (TBARS), values of patties were much lower than the values for patties with free O<sub>2</sub> contact (loose packaging) and did not increase substantially during storage. The TBARS values of cold packaged patties were higher ( $P < 0.05$ ) than those of hot packaged patties which had almost no O<sub>2</sub> contact after cooking. The effect of NaCl on the catalysis of lipid oxidation was not clear. But NaCl helped in spreading free ionic Fe or Fe binding proteins. GS

2398

Ahn (DU), Wolfe (FH) and Sim (JS). **Prevention of lipid oxidation in pre-cooked turkey meat patties with hot packaging and antioxidant combinations.** *Journal of Food Science* 58(2); 1993; 283-287

The effects of combinations of antioxidants under conditions of hot or cold packaging on lipid oxidation in turkey meat patties during refrigerated storage was studied. Hot packaging produced 2-thiobarbituric acid reactive substances (TBARS) values for all patties with added antioxidants which were lower ( $P < 0.05$ ) than those patties with no antioxidant added, throughout the storage periods. The combination of hot packaging and all antioxidants tested controlled lipid oxidation of the patties during storage. When  $\alpha$ -tocopherol or ascorbate was combined with TPP, citrate, cysteine, histidine or egg white, the TBARS values of both hot and cold packaged meat patties were very low. The influence of antioxidants was much stronger than that of packaging. Hot packaging or hot packaging plus antioxidant has the most antioxidant effects with no prooxidant added, least with NaCl added and intermediate with FeCl<sub>2</sub> or FeCl<sub>2</sub> + NaCl added. The combination of antioxidants and hot packaging protected cooked patties better, from lipid oxidation, than antioxidant of hot packaging alone. GS

2399

Ahn (DU), Wolfe (FH) and Sim (JS). **Three methods for determining non-heme iron in turkey meat.** *Journal of Food Science* 58(2); 1993; 288-291

The ferrozine, the Schricker and modified Schricker methods were used to measure the non-heme Fe in raw and cooked turkey meat. The ferrozine method gave the lowest non-heme Fe values, while results from the Schricker and modified Schricker were not different ( $p < 0.05$ ). When hemoglobin (Hb) was added to breast meat, however, differences ( $p < 0.05$ ) between the Schricker and modified Schricker, and Schricker and ferrozine methods were observed in cooked meat with NaCl. Cooking and addition of NaCl caused increase in measured non-heme Fe content and had a synergistic effect on the release of non-heme Fe in meat. AA

## Products

### Eggs

2400

Chiang (BH), Su (CK), Tsai (GJ) and Tsao (GT). **Egg white lysozyme purification by ultrafiltration and affinity chromatography.** *Journal of Food Science* 58(2); 1993; 303-306

Isolation and purification of lysozyme from hen egg white was studied using a two-step procedure. The egg white was diluted 5- to 9-fold with sodium phosphate buffer, and then processed by sequential dilution diafiltration using a UF membrane (mol. wt. cut off 300,000 dalton). The membrane process increased the specific activity of lysozyme 6-fold, and recovered 96% of lysozyme activity. The permeate from diafiltration was further purified by affinity chromatography using chitin as adsorbent. The second step of the process yielded a product of specific activity of 70,400 units/mg protein. The overall lysozyme recovery was 79%. AA

2401

Ohba (R), Teramoto (Y) and Ueda (S). **Clarification of spray-dried egg yolk suspensions and solubilization of proteins from lipoproteins.** *Journal of Food Science* 58(2); 1993; 307-309, 356



The separation of proteins and lipids from spray-dried egg yolk was attempted using commercial enzymes and mold enzymes. Good solubilization of protein from spray-dried egg yolk suspension (clarification of the suspension), could not be obtained with purified commercial enzymes (protease, lipase and phospholipase), but 3 crude enzymes extracted from molds and one commercial enzyme produced good results. Among them, Newlase F (crude preparation, derived from the genus *Rhizopus*) successfully clarified the spray-dried egg yolk suspension (pH 4.7, 40°C, 5-8 h) thereby solubilizing about 85% of the total protein in the whole spray-dried egg yolk. AA

2402

Banka (L), Petrovic (S) and Becarevic (A). **Lysozyme isolation from hen egg-white on fractogel TSK CM-650.** *Lebensmittel-Wissenschaft und -Technologie* 26(1); 1993; 76-78

The conditions of lysozyme isolation by one-step ion-exchanger column chromatography from hen egg-white (HEW) have been investigated on Fructogel TSK CM-650, weak acid cation ion-exchanger. Different recoveries of enzyme activity have been obtained on different pH values. The best recovery was at pH 9.0 involving electrophoretically pure enzyme. This pH value coincides with the natural pH value of HEW. AA

## SEAFOODS

2403

Makarios-Laham (IK) and Lee (T-C). **Protein hydrolysis and quality deterioration of refrigerated and frozen seafood due to obligately psychrophilic bacteria.** *Journal of Food Science* 58(2); 1993; 310-313

Two obligately psychrophilic marine *Vibrios*, MV-3 and MV-6, hydrolyzed proteins and deteriorated refrigerated and frozen seafoods (fresh and cooked shrimp, fish, and scallops). Protein hydrolysis was determined after storage at 4 and -20°C, and reported as the percent

increase over uninoculated controls stored under the same conditions. When fresh shrimp was inoculated with isolate MV-3, increases in protein hydrolysis were 19.2% after 2 wk refrigeration and 14.2% after 12 wk frozen storage. Thus, the isolates were capable of hydrolyzing protein and deteriorating quality of fish and shellfish under refrigeration or frozen storage. AA

2404

Devarajan (S). **An economic analysis of marine product export from India.** *Madras Agricultural Journal* 80(1); 1993; 23-27

2405

Venugopal (V). **Cook-chill process to extend refrigerated shelf-life of peeled and deveined shrimp and white pomfret.** *International Journal of Food Science and Technology* 28(3); 1993; 273-278

Freshly caught white pomfret (*Stromateus cinereus*) and shrimp (*Penaeus indicus*) samples were treated in 10% (w/v) NaCl in potable water at 25 plus or minus 1°C for upto 2.5 h and then drained. The drained samples were stirred for 2-5 min. in 2 to 5% sodium tripolyphosphate (STPP) in a water at a fish/shellfish to sol. ratio of 5:1 and drained. The samples were steam cooked for 15 min, cooled (0°C for 15 min), held in a cold room at 3 plus or minus 0.5°C, packed, sterilized (25 kGy), sealed and stored at 3 plus or minus 5°C. Processed shrimp and pomfret after brining in 10% NaCl for 2 h showed total microbial counts (TMC) of  $1 \times 10^3 \text{ g}^{-1}$ . Steaming reduced the TMC to < 10 for shrimp and 20 for pomfret. Counts for shrimp and pomfret did not increase after one month of storage at 3 or 10°C. The sensory attributes showed little deterioration after 25 days to improve on brine alone at 3°C, with a tendency for STPP treatment to improve on brine alone. The products were in acceptable condition for 25 days. BV

2406

Ramachandran (A), Ranganathan (N) and Samuel (CT). **Observations on the process control factors in the seafood plants in Kerala.** *Fishery Technology* 29(2); 1992; 132-135



Process control factors, freezing time, freezing temp., cold storage temp., drained wt., packing count and bacterial counts were studied in 6 seafood processing plants selected at random from Kochi region, India. Fluctuations in cold store temp. of even 10°C which had adverse effects on product quality was noticed in some plants. Total bacterial counts of frozen shrimps were within specified standards. There was no incidence of *Vibrio cholerae* and *Salmonella*. SRA

## Crabs

2407

Gates (KW), Parker (AH), Bauer (DL) and Haung (Y-W). **Storage changes of fresh and pasteurized blue crab meat in different types of packaging.** *Journal of Food Science* 58(2); 1993; 314-317

The effect of packaging materials (steel cans, Al cans, plastic cans, non barrier pouches, barrier pouches) on quality, shelf-life and safety of fresh and pasteurized blue crab meat (BCM) was studied. Fresh BCM was packed in copolymer polyethylene/polypropylene cups, saran over-wrapped or vacuum skin packaged polystyrene trays and nonbarrier pouches. BCM pasteurized in plastic and Al cans had better sensory and microbiological quality and longer shelf-life than BCM packed in steel cans. Oxygen-barrier pouches had the lowest quality and shortest shelf-life. No packaging materials improved the microbiological shelf-life of freshly cooked BCM. Vacuum skin packaging improved the sensory qualities of freshly cooked and picked BCM. GS

## Mussels

2408

Kulkarni (AN) and Keshavan (R). **Effect of sublethal concentration of dimecron on vitamin C content in tissues of *Lamellidens corrianus*.** *Fishery Technology* 29(2); 1992; 151-153

Fresh water mussel, *Lamellidens corrianus* was exposed to 3 sublethal concn. ( $0.4 \times 10^{-2}$ ) of Dimecron, and organophosphate insecticide for 24, 48, 72 and 96 h. Changes in vitamin C content were observed after each exposure

period. Vitamin C content was observed to decrease in hepatopancreas, gill and foot. Changes in vitamin C content in relation to exposure period and concn. of Dimecron are discussed. AA

## Shellfish

2409

Sundarrao (K), Tinkerame (J), Kaluwin (C), Singh (K) and Matsuoka (T). **Fatty acid and mineral composition of shellfish (*Gelonia papua*).** *Fishery Technology* 29(2); 1992; 144-146

Dry shellfish (*Gelonia papua*) meat showed 15.2% lipids of which 58.4% was nonpolar, 41.6% phospholipids, 51.2% protein, 7.44% ash contents. Mineral and heavy metal composition were Cu 20.30 plus or minus 1.97, Zn 104.00 plus or minus 10.6, Cd 2.75 plus or minus 0.47, Pb 0.20 (µg/g), Fe 1.72 plus or minus 0.16, Na 1.64 plus or minus 0.11, K 1.85 plus or minus 0.21, Ca 5.61 plus or minus 0.50, Mg 1.01 plus or minus 0.13 (mg/g), Hg 0.23, As 0.001 and Se 0.32 plus or minus 0.021 (µg/g). SRA

## Squids

2410

Kugino (M), Kugino (K) and Wu (Z-H). **Rheological properties of dried squid mantle change on softening.** *Journal of Food Science* 58(2); 1993; 321-324

To clarify differences between raw squid and softened dried squid, dried squid mantle was softened under various conditions, degree of swelling and certain properties were measured, and the musculature was examined by electron microscopy. Swelling the dried squid to the original level of raw squid required softening in 3 steps: pre-soaking, alkali-soaking, and post-soaking. The alkali-soaking was mainly responsible for the swelling effect. Resulting properties were largely changed from those of raw squid. Electron microscopy showed much water permeation throughout the muscle fibrils and fibers, while there was almost no permeation of water inside the individual fibrils. AA



## Fish

2411

Ramanathan (L) and Das (NP). **Natural products inhibit oxidative rancidity in salted cooked ground fish.** *Journal of Food Science* 58(2); 1993; 318-320, 360

The extent of lipid oxidation in salted cooked ground fish treated with several natural products (polyphenols, dried spices and fresh spices) was measured by the production of thiobarbituric acid reactive substances (TBARS). The fresh spices, ginger and turmeric, were more potent than garlic and onion (at 10% conc) in inhibiting lipid oxidation in salted cooked ground fish. The order of antioxidative potency of the dried spices was : cloves > cinnamon > cumin = black pepper > fennel = foenugreek. The dried spices were more effective antioxidants than fresh spices. The polyphenols were the most potent group of natural antioxidants. The order of potency of the polyphenols (0.01% concn.) was : ellagic acid > tannic acid > myricetin > quercetin. AA

2412

Ramanathan (L) and Das (NP). **Effect of natural copper chelating compounds on the pre-oxidant activity of ascorbic acid in steam-cooked ground fish.** *International Journal of Food Science and Technology* 28(3); 1993; 279-288

Results of the study indicate that the natural products (NP) exert their antioxidative action through their metal chelating properties, thereby inhibiting ascorbic acid-induced lipid oxidation in steam-cooked ground fish (*Scomberomorus commersoni*). The order of potency of the : tannic acid was approx. equal to ellagic acid > myricetin > n-propyl gallate > fisetin > quercetin approx. equal to luteolin > gallic acid. BV

2413

Winkler (M), Pilhofer (G) and Germa (JB). **Stereochemical specificity of the N-9 lipxygenase of fish gill.** *Journal of Food Biochemistry* 15(6); 1991; 437-448

Stereospecificity of oxygen addition distinguishes initiated lipid peroxidation from nonenzymatic autoxidation that produces a racemic mixture. Similarly, the positional and stereoconfiguration of lipxygenase metabolites of unsaturated fatty acids determine their precise physiological bioactivity. Teleost fish gills produce predominantly the 12 hydroxy derivative of arachidonic and eicosapentaenoic acids. Following reaction of arachidonic acid with fish gill lipxygenase, 12-hydroxyeicosatetraenoic acid (12-HETE) was isolated using column chromatography and HPLC. Chiral phase HPLC revealed that the single 12(S) HETE isomer was produced by the enzyme. Proton NMR further confirmed the structure as identical to the 12(S) HETE produced in mammalian platelets and lungs. AA

2414

Horner (B). **Fish smoking: ancient and modern.** *Food Science and Technology Today* 6(3); 1992; 166-171

Smoking as a preservation technology to ensure safe high quality fish produce; its importance in ensuring preservation, flavour, shelf-life and safety of fish from pathogenic microorganisms are discussed. GS

2415

Mathew (PT) and Gopakumar (K). **Effect of incorporation of vegetable colour from red sandal (*Pterocarpus santalinus*) on acceptability, colour development and growth of tilapia (*Tilapia mossambuca*).** *Fishery Technology* 29(2); 1992; 124-126

Three groups Tilapia fish (control, test 1, test 2) were fed with diet having 28-30% protein, 42% carbohydrate, 4% fat and 9% crude fibre. Red colour extract (RCE) from red sandal wood (*Pterocarpus santalinus*) (RSW) was incorporated in the test feed composition. Effect of RCE on fish were evaluated. It was found that feeding tilapia with diets incorporated with RCE from RSW increased the feed intake and wt., and imparted an attractive red/orange colour to the fish muscle. SRA



2416

Hedge (G), Chandrasekhar (TC) and Dora (KC). **Quality changes of fish sausage incorporated with potato starch powder at room temperature.** *Fishery Technology* 29(2); 1992; 136-139

Fish sausage from the minced meat of croaker (*Johnius* spp.) with potato starch dried powder (PSP) and control sample (CS) were prepared and stored at room temp. of 28 plus or minus 2°C. Water content of CS increased from 4.22 to 8.74% on 3rd day, while that of PSP added samples from 4.22 to 8.62 on 2nd day before they were spoiled due to discolouration. pH of CS decreased to 6.6 on 3rd day, while for PSP samples to 6.5 on 2nd day. CS remained in acceptable condition for 3 days, but PSP samples for only 2 days. Total plate count of CS were lower than PSP samples. SRA

2417

Apte (D) and Maithilli Rao. **Electrophoretic studies on eye lens and muscle proteins of some flat fishes off Bombay coast.** *Fishery Technology* 29(2); 1992; 147-150

Electrophoretic profiles of eye lens protein and muscle proteins of *Cynoglossus macrolepidotus*, *Pseudorhombus elevatus*, *Zebrias quagga* and *Asopia cornuta* show sp. specific band pattern. A total of 8, 9, 10 and 9 bands in eye lens proteins and 7, 5, 9 and 5 bands in muscle proteins were observed in the above mentioned fishes respectively. Use of electrophoretic profile of eye lens proteins and muscle proteins in fish taxonomy is discussed. AA

2418

Philip (R) and Lakshmanaperumalsamy (P). **Bacterial growth and protein degradation in different fish flesh extracts and casein media.** *Fishery Technology* 29(2); 1992; 154-157

The time course of growth and protein degradation of 4 strains of proteolytic bacteria (*Pseudomonas* sp. Ca 173 isolated from *Penaeus indicus*, *Pseudomonas* sp. Ca 386 from *Metapenaeus dobsoni*, *Vibrio* sp. Ca 377 from *Liza parsia* and *Vibrio* sp. Ca 761 from *Penaeus indicus*) in various flesh (prawn, clam and fish)

and casein media were studied. During the first 12 h of incubation, growth rate of all the strains were higher in prawn flesh broth compared to other media except for *Pseudomonas* sp. Ca 173. On prolonged incubation these bacteria did grow equally well in other media also. In all the media, protein degradation commenced on the 3rd day and progressed rapidly. SRA

2419

Sanjeev (S) and Stephen (J). **Antibiotic sensitivity of Kanagawa-positive and Kanagawa-negative strains of *Vibrio parahaemolyticus* isolated from fishes marketed in Kochi.** *Fishery Technology* 29(2); 1992; 162-165

Eightyfour strains of *Vibrio parahaemolyticus* consisting of 48 kanagawa-positive and 36 kanagawa-negative strains isolated from finfishes and shellfishes marketed in Kochi were tested for their sensitivity towards 11 antibiotics. Max. sensitivity was observed towards chloramphenicol (98.81%) and gentamycin (97.62%) followed by polymyxin-B (52.38%), neomycin (46.43%), tetracycline (23.81%), sulphadiazine (21.43%), ampicillin (17.86%), kanamycin (1.19%), streptomycin (11.9%) and erythromycin (1.19%). None of the isolates were sensitive to penicillin. Among kanagawa-positive strains of *V. parahaemolyticus* 100% sensitivity were found towards none of the tested antibiotics, but max. sensitivity was shown towards chloramphenicol (97.92%) and gentamycin (95.83%). All the kanagawa-negative strains of *V. parahaemolyticus* were sensitive towards chloramphenicol and gentamycin. Kanagawa-negative strains of *V. parahaemolyticus* were found to be more sensitive to the tested antibiotics compared to kanagawa-positive strains. AA

## Hakes

2420

Careche (M) and Tejada (M). **Interaction between triolein and natural hake actomyosin during frozen storage at -18°C.** *Journal of Food Biochemistry* 15(6); 1991; 449-462



The interaction of hake muscle actomyosin with triolein in 0.6 M KCl, pH 7, during frozen storage has been investigated. ATPase activity, protein solubility and relative viscosity measurements were performed. No effect of triolein on these functional properties was observed during the storage period studied. Incorporation of 1-<sup>14</sup>C triolein to the protein was found over the storage period, indicating that despite the lack of effect on functionality, lipid-protein interaction occurs. No differences were found in the electrophoretic patterns between control and neutral lipid added samples. AA

## Mackerels

2421

Venugopal (V) and Nair (PM). **Radiation preservation of seafoods: A case study on Indian mackerel.** *Fishery Technology* 29(2); 1992; 114-123

Information on the use of low dose  $\gamma$ -radiation for shelf-life extension of Indian mackerel in ice is consolidated. Radiation process, storage, packaging, microbiology, radiation induced changes, lipids, protein, safety, irradiation detection, transportation, bulk irradiation, and economics are detailed. Indian mackerel in ice could be irradiated at landing centres to achieve quality retention and enhance the marketability of the catch. SRA

## Pomfrets

2422

Viswanathan Nair (PG) and Sankar (TV). **Seasonal variation in the susceptibility of pomfret lipids to autoxidation.** *Fishery Technology* 29(2); 1992; 140-143

The study on seasonal variations in the lipid content of small and big silver pomfrets (*Pampus argenteus*) and extent of peroxide formation of these lipids, big fish showed higher lipid content (650-813 g) than the small fish (283-400 g) in any season. Max. lipid and peroxide values were found during April to June. Development of oxidative rancidity was max. during December and January and min. during June to August. Free fatty acid level in

the lipid showed no effect on formation of peroxide. SRA

## Sardines

2423

Serrao (AD), Hiremath (GG) and Dora (KC). **Quality changes in white sardine, Kowala coval (cv.) during frozen storage.** *Fishery Technology* 29(2); 1992; 127-131

Quality changes in white sardine kowala coval (cv.) treated with 0.01% BHA, 0.1% ascorbic acid and 500 p.p.m. level sulphite during frozen storage at -20°C for a period of 180 days were evaluated. Sardine iced immediately after harvest and subsequently frozen within 6-8 h was in good condition over a period of 6 months at -20°C. There was no significant difference in quality between control and treated sardine. SRA

2424

Shetty (TS), Setty (TMR) and Ravishankar (CN). **Temperature growth response of spoilage bacteria isolated from Indian oil sardine (*Sardinella longiceps*) stored in chilled sea water.** *Fishery Technology* 29(2); 1992; 158-161

Optimum growth temp. of different bacterial genera, important in the spoilage of Indian oil sardine (*Sardinella longiceps*) stored in chilled sea water was studied. Isolates belonging to different bacterial genera, selected from plates incubated at 28 plus or minus 2°C and 2 plus or minus 1°C, were tested for their growth response at different temp. The results indicated that the spoilage bacteria, irrespective of their primary isolation temp. showed good growth response only at the temp. ranging from 2 plus or minus 1°C to 28 plus or minus 1°C, indicating their facultative psychrophilic nature. AA

## PROTEIN FOODS

Nil



2425

Delgado (MMM), de la Torre (AH) and Marante (RA). **Direct potentiometric determination of fluoride in beverages. Comparative study of different buffering solutions.** *Food Chemistry* 46(1); 1993; 85-88

Beer and soft drinks manufactured on Tenerife island were studied by standard additions technique. The accuracy and precision for each of the buffer sol. were expressed in terms of av. and standard deviation of recovery percentages. Orthophosphoric acid (0.75 M) was found as the optimum buffering sol. Potentiometry preceded by heat-facilitated diffusion with or without incineration of the sample showed the presence of all fluoride in soft drinks except beer in ionic form. SD

## Alcoholic beverages

### Whisky

2426

Piggott (JR), Commer (JMI), Paterson (A) and Clyne (J). **Effects on scotch whisky composition and flavour of maturation in oak casks with varying histories.** *International Journal of Food Science and Technology* 28(3); 1993; 303-318

Scotch whisky distillates in casks with different histories, but typical of those used in industrial practice, were compared by chemical and sensory methods over the first 3 years of maturation. Analysis by capillary GC showed differences in wood-derived components, and analysis of non-volatile and less-volatile compounds by HPLC showed clear changes with maturation time, and differences between casks. Descriptive sensory analysis showed changes associated with the early stages of maturation, and some differences between casks. Sensory descriptor scores associated with wood-derived materials (spicy, smooth, vanilla, woody) were modelled on data from non-volatile compounds using partial least squares regression. AA

2427

Edwards (CG), Powers (JIR), Jensen (KA), Weller (KM) and Peterson (JC). **Lactobacillus spp. from Washington state wines: Isolation and characterization.** *Journal of Food Science* 58(2); 1993; 453-458

Species of *Lactobacillus* were isolated and identified from commercial Washington state grapes and wines including *L. brevis* (4 strains), *L. hilgardii* (4), *L. plantarum* (3), and *L. fructivorans* (1). Unlike other strains, *L. brevis* and *L. plantarum* grew in media at relatively low pH (pH 3.16 and 3.34). Sulphur dioxide inhibited all strains as growth was delayed in 33 mg/L total SO<sub>2</sub> (pH 3.5). None of the strains grew in 12% or 14% ethanol. Alcoholic fermentations of two grapes musts were not slowed in the presence of strains of *L. brevis*, *L. hilgardii*, or *L. plantarum*. AA

2428

Forcen (M), Berna (A) and Mulet (A). **Using aroma components to characterize majorcan varietal red wines and musts.** *Lebensmittel-Wissenschaft und -Technologie* 26(1); 1993; 54-58

The volatile aroma composition of two Majorcan red varietal wines (Manto Negro and Callet), and the corresponding grape musts belonging to 2 different viticultural regions (zona Alta and zona Baja) were studied. Chemical data of 9 and 16 compounds identified and quantified by GC-MS in musts and wines, respectively, were treated by both Pattern recognition techniques, stepwise discriminant analysis (SDA) and principal component analysis (PCA) in order to achieve a possible characterization. The greatest differences observed in musts by SDA were due to grape var. Manto Negro presented higher concn. in cis-3-hexen-1-ol, while Callet was richer in trans-2-hexen-1-ol and benzyl alcohol. Discriminant analysis gave rise to good classification results in wines for both cv and geographic origin, being isoamyl acetate, γ-butyrolactone, linalool, n-hexanol, and 2-phenyl acetate, cis-3-hexen-1-ol, isoamyl acetate, trans-2-hexen-1-ol, respectively, the selected variables in terms of characterization.



Finally, the application of PCA to the former samples revealed a natural grouping of musts according to var. whereas in wines a good geographical association among the analysed samples was also achieved. AA

## Non-alcoholic beverages

### Fruit juices

2429

Singh (NI), Madaiah (N) and Nanjundaswamy (AM). **Preliminary studies on clarification of fruit juices by ultrafiltration.** *Indian Food Packer* 47(5); 1993; 9-15

Lime, cashew apple and pomegranate fruit juices were clarified in an ultrafiltration unit having membrane cassette of 10,000 MWCO. Clarified juices showed better retention of ascorbic acid (2-5% loss), higher yield (97.8%) and better clarity (98.5%) than conventionally clarified juice. The permeation rate (flux) of all juices increased with transmembrane pressure at constant temp. GS

2430

Tomas-Barberan (FA), Garcia-Viguera (C), Nieto (JL), Ferreres (F) and Tomas-Lorente (F). **Dihydrochalcones from apple juices and jams.** *Food Chemistry* 46(1); 1993; 33-36

Two dihydrochalcone glycosides were isolated by a combination of Amberline XAD-2 and reversed phase liquid chromatography, and by semipreparative HPLC. They were identified as 2',4',6',4'-tetrahydroxydihydrochalcone-dihydrochalcone-2'-o-(6"- $\beta$ -D-xylopyranosyl)- $\beta$ -D-glucopyranoside by spectroscopic methods. SD

### Apple juices

2431

Padilla-Zakour (O) and McLellan (MR). **Optimization and modeling of apple juice cross-flow microfiltration with a ceramic membrane.** *Journal of Food Science* 58(2); 1993; 369-373

The performance of a 0.2  $\mu$ m ceramic membrane for clarification of depectinized

apple juice was studied. The results showed that the flux was higher at high feed velocities (14.6 m/sec) and high temp. (50°C), and the transmembrane pressure was a positive factor only at high temp. The juice flux at optimal conditions was between 400-500 kg/hr.m<sup>2</sup>. Filtration of juice with pectin resulted in flux decreases of 40-50% compared to depectinized juice. Periodic back-flushing during processing at optimal conditions, i.e., high temp., high feed velocity and low pressure, did not significantly increase the juice flux. AA

2432

Leach (G), Schols (H), Pyle (L) and Niranjan (K). **Influence of processing regime on certain characteristics of diffusionaly extracted apple juice.** *International Journal of Food Science and Technology* 28(3); 1993; 261-272

The composition of apple juices produced by diffusional extraction under different processing regimes was investigated. It was demonstrated that the viscosity characteristics of a juice are dependent on the amount and nature of its pectic substances. With the exception of the addition of a pectin-degrading enzyme, the juice viscosity was most strongly dependent on the degree of esterification of the juice pectin and was also affected by the presence of Ca ions. The degree of esterification of the pectin, and hence the juice viscosity, could be manipulated by changing the process temp. or by changing the residence time in the extractor. AA

2433

Giovanelli (G) and Ravasini (G). **Apple juice stabilization by combined enzyme-membrane filtration process.** *Lebensmittel-Wissenschaft und -Technologie* 26(1); 1993; 1-7

Stabilization against discolouration and clouding is a major problem in fruit juice production. Effects of enzymatic oxidation of polyphenols, associated with 'active filtration' and membrane filtration were evaluated, in terms of juice characteristics and stability. Laccase oxidation produces a significant decrease in the phenolic content of juices, associated with a remarkable colour increase. Active filtration by polyvinylpolypyrrolidone



and activated charcoal partially decolourates the oxidized juices and stabilizes these products, removing a high quantity of phenolic compounds. Membrane filtration demonstrates to be an effective technique in terms of stabilization only if performed using low mol. wt. cut-off membranes. AA

### Mango juices

2434

Adesina (AA), Ogintimein (GB) and Obisanya (MO). **Kinetic analysis of the fermentation of mango juice.** *Lebensmittel-Wissenschaft und -Technologie* 26(1); 1993; 79-82

An analysis of the kinetic data from the fermentation of mango juice using yeast strains obtained from fermented palm juice is reported. The fermentation rate has between first and second order dependency on sugar concn. but is relatively weakly dependent (fractional order) on the hydrogen ion concn. in the medium. A relationship between the alcohol yield and the kinetic rate constants was also derived. Based on this analysis, it seems that mango juice fermentation with yeast isolates from the bottom of palm juice is the most efficient for alcohol production. AA

### Orange juices

2435

Ekasari (I), Fokkens (RH), Bonestroo (MH), Schols (HA), Nibbering (NMM), Pilnik (W). **Characterization of mutagenic compounds in heated orange juice by UV and mass spectra.** *Food Chemistry* 46(1); 1993; 77-79

Mutagenic fractions from heated orange juice (93°C, 2 min) obtained by gel filtration and HPLC were subjected to modified *Salmonella* mutagenicity assay (pH adjusted to 7.4; 4 h preincubation at 37°C) and UV/mass spectra examination. Fast atom bombardment-mass spectrometry and mass analysed ion kinetic energy techniques to elucidate the mol. wt. and chemical structure of the mutagenic compounds showed compounds with 162, 180, 254, 288, 342, 360 and 540 dalton mol. wt. SD

### Watermelon juices

2436

Chakraborty (S), Agrawal (MD) and Shukla (IC). **Studies on proeparation of ready-to-serve beverage from watermelon (*Citrullus vulgaris*) juice.** *Beverage and Food World* 20(1); 1993; 30-32

This study showed that the stabilization of watermelon juice against sedimentation was not successful when conventional stabilizers were employed. However by addition of a permitted colour to the clarified juice, watermelon sweetened juice and RTS beverages with or without blending with lime juice of pineapple juice of acceptable quality may be prepared which have a shelf-life of upto 6 months. The products showed no marked changes in chemical and sensory quality during storage at room temp. SRA

### FATS AND OILS

2437

Dickinson (E), Owusu (RK), Tan (S) and Williams (A). **Oil-soluble surfactants have little effect on competitive adsorption of  $\alpha$ -lactalbumin and  $\beta$ -lactoglobulin in emulsions.** *Journal of Food Science* 58(2); 1993; 295-298

Protein surface concn. in emulsions stabilized by  $\alpha$ -lactalbumin ( $\alpha$ -la),  $\beta$ -lactoglobulin ( $\beta$ -lg) and their mixture were studied with various amounts of oil-soluble surfactant present during homogenization. Three different surfactants were considered: diethyl glycol n-dodecyl ether (C<sub>12</sub>E<sub>2</sub>), sorbitan monooleate (Span 80), and glycerol monostearate (GMS). In n-tetradecane-in-water emulsions, low concn. of C<sub>12</sub>E<sub>2</sub> or Span 80 resulted in a smaller average droplet size and a greater total protein surface coverage; it was found that the opposite effect at high surfactant concn. The effect of GMS in soybean oil-in-water emulsions was slight. In emulsions containing  $\alpha$ -la +  $\beta$ -lg, separate surface coverages of the whey proteins did not differ significantly. The competitive adsorption of milk proteins in food emulsions is unlikely to be affected by surface-active impurities present in typical food oils. AA



Bhattacharya (DK) and Chaudhuri (S). **Preparation and application of monolaurin in margarine and pharmaceutical products.** *Journal of the Oil Technologists Association of India* 25(3); 1993; 61-62

The study with margarine and pharmaceutical ointment base showed monolaurin, a monoglyceride as an effective emulsifier and antimicrobial preservative. Hence its use in the preparation of food emulsions and margarine is possible. GS

2439

Hasain (S), Sastry (GSR), Ravi Prasad (P) and Sitarama Rao (K). **Polarographic estimation of free fatty acids/organic acids.** *Journal of the Oil Technologists Association of India* 25(3); 1993; 63-64

A simple and precise polarographic method is developed and reported for the estimation of free fatty acids/organic acidity in vegetable oils and petroleum products respectively, using 0.02 M tetrabutyl ammonium iodide (Bu<sub>4</sub>) NI in dimethyl formamide (DMF) as supporting electrolyte. Acids are extracted with 95% ethanol and the extract analysed. The method is useful for the estimation of free fatty acids especially for dark coloured samples where the conventional methods fail to detect the end point. Results compared with the conventional methods showed good agreement. AA

2440

Anon. **Survey by a working party of the DGF, 133rd report: Bleaching of edible fats and oils. I. FAT Science Technology** 95(4); 1993; 123-126 (De)

2441

Biedermann (M), Grob (K) and Mariani (C). **Transesterification and on-line LC-GC for determining the sum of free and esterified sterols in edible oils and fats.** *FAT Science Technology* 95(4); 1993; 127-133

A method is proposed to substitute the classical saponification procedure for the detn. of the sterols and other minor components in edible oils and fats. Saponification is replaced by

transesterification, which liberates sterols and alcohols from esters under mild conditions, but does not form soap hindering the extraction of the neutrals. Triglycerides are turned into fatty acid methyl esters, which are removed by automated LC-GC. LC also pre-separates the minor components into classes, e.g., of linear alcohols, triterpenes, methylsterols,  $\Delta 5$  sterols, and  $\Delta 7$  sterols. Multiple LC-GC transfer allows obtaining several gas chromatograms from the same injection into LC. Sample preparation takes some 5 min; 10-25 samples can be analyzed by an LC-GC instrument, depending on the number of LC fractions transferred to GC per sample. AA

2442

Senthil (C), Roychoudhury (P) and Kaushik (BD). **Lipid profiles of halosensitive *Calothrix marchica* and halotolerant *Calothrix bharadwajae*.** *Indian Journal of Microbiology* 33(4); 1993; 281-285

Total lipid content was reduced to half both in the halosensitive *Calothrix marchica* ARM 659 and in the halotolerant *Calothrix bharadwajae* ARM 558 when grown at 50 and 350 mM NaCl respectively. Common fatty acids detected in the extracted lipids of both the strains were from C8 to C18. In response to NaCl challenge the quantity of caprylic acid, nonanoic acid and trimyristolein were substantially decreased whereas, capric, undecanoic, lauric, palmitoleic, heptadecanoic and stearic acids increased in the halotolerant strain. The halosensitive *Calothrix marchica* differed from that of the halotolerant *Calothrix bharadwajae* in the absence of nonanoic acid and palmitoleic acid. AA

2443

Sinclair (AJ). **The nutritional significance of  $\omega 3$  polyunsaturated fatty acids for humans.** *ASEAN Food Journal* 8(1); 1993; 3-13

Review covers the essential fatty acids, the dominance of the  $\omega 3$  PUFA in food supply, emerging interest in  $\omega 3$  PUFA,  $\omega 3$  PUFA and Greenland Eskimos, the effect of  $\omega 3$  PUFA on plasma lipids level, blood pressure, cardiac arrhythmia and atherosclerosis, intervention trials and epidemiological observations on  $\omega 3$  PUFA,  $\omega 3$  PUFA and inflammatory disease,  $\omega 3$



PUFA and non-insulin dependent diabetes mellitus (NIDDM), plant and marine sources of  $\omega$ 3 PUFA. Review concludes that the inclusion of greater levels of  $\omega$ 3 fatty acids in our diet will be likely to lead to positive benefits on the health of the population. 77 references. SRA

## Oils

2444

Hasan (SQ) and Osman (SM). **Studies on indigenous seed oils.** *Journal of the Oil Technologists Association of India* 25(3); 1993; 47-49

Seed oils from 4 sp. (*Celosia argentea*, *Centaurea moschata*, *Delphinium ajacis* and *Sesbania sesban*) were analysed for component acids mainly by chromatographic and spectroscopic techniques. The oil composition of 3 sp. reported here (viz. *C. moschata*, *D. ajacis* and *S. sesban*) was not reported so far. Two sp. (*C. moschata*, 20.1%; *D. ajacis*, 32.0%) were found oil rich and deserve agronomic evaluation as the *C. moschata* resembled safflower (especially grown in tropics). *D. ajacis* yielded oleic rich (46.5%) seed oil accompanied by eicos-cis-11-enoic (20:1) acid in major proportion (27.1%). AA

2445

Nogala-Katucka (M), Gogolewski (M) and Suliatkiewicz (E). **Changes in the composition of tocopherols and fatty acids in post deodorisation condensates during refining of various oils.** *FAT Science Technology* 95(4); 1993; 144-147

For refining of different plant oils the same industrial installations are used and the last stage is the process of deodorisation. The waste product obtained during the deodorisation process is the postdeodorisation condensate (oil scum). Oil scum contains several valuable components, such as polyunsaturated free fatty acids and tocopherols. Qualitative and quantitative composition of tocochromanols and free fatty acids depend on the kind of the refined oil. Postdeodorisation condensates from the refining of rape, sunflower and soybean oils were investigated. Prevailing acid in all postdeodorisation condensates was the oleic

acid the quantity of which ranged from 50% to 58.7%. Second was the linoleic acid, which was found in quantity amounting to 20% during the refining of rape and soybean oils, but in the condensate coming from sunflower oil its content was by 10% greater. The results obtained during quantitative detn. of tocochromanols correlated with their quantity in oils, but it was observed that greater distillation of  $\gamma$ -T and  $\alpha$ -T than of  $\delta$ -T. The reason for this is smaller quantity of  $\delta$ -T in the oil which is undergoing the process of deodorisation. AA

2446

Kachare (DP), Chavan (JK), Chavan (UD) and Kadam (SS). **Effect of storage on chemical changes in palm, groundnut and cottonseed oils and their blends.** *Beverage and Food World* 20(1); 1993; 16-17

Refined palm oil (PO) was blended separately with crude groundnut (GO) and cotton seed oils (CSO) (75:25, 50:50 and 25:75 v/v proportions) and stored at 27 plus or minus 2°C upto 150 days. The oil samples were analysed at 30 days interval for changes in iodine number, saponification value, acid value and peroxide number. The iodine numbers of GO and CSO were above 90 while that of PO. The peroxide values for GO, CSO and PO were 4.2, 4.1 and 1.4 respectively. Blending PO with either GO or CSO proportionately decreased the peroxide of oil blends. The acid values increased during storage, but did not exceed the upper limit of 2.0 for any oil. The blended oils showed improved shelf-life over GO and CSO. The blending did not influence the sensory properties of Kharashev significantly. SRA

2447

Ranhotra (GS). **Nutritional and functional considerations of tropical oils.** *Cereal Foods World* 38(7); 1993; 486-489

The author suggests that the controversy surrounding tropical oils is misleading and describes their uses and applications in food products. CSA

2448

Miller (KL). **High-stability oils.** *Cereal Foods World* 38(7); 1993; 478, 480-482



The distinction between the two processes involving the rancidity of oil resulting from hydrolysis and that resulting from oxidation is described followed by a discussion on the techniques for the production of high-stability oils and their uses in food applications (frying medium, moisture barrier, antidusting agent, protective coating, spray or topping oil, ice cream coating, carrier oil or lubricant or release agent). CSA

### Canola oils

2449

Stanton (J). **Canola in the United States.** *Cereal Foods World* 38(7); 1993; 483-485

The past and present status of canola oil in the United States is presented in this article. CSA

### Niger seed oils

2450

Balasubramanyam (N) and Naik (HR). **Packaging and storage studies of niger seed oil (*Guizotia abyssinica*).** *Indian Food Packer* 47(5); 1993; 19-35

The suitability of typical coextruded films and laminates for consumer unit packaging of niger seed oil was studied. Tensile strength of coextruded films - (1) 100 micron thick green pigmented coextruded film of linear low density polyethylene (LLD)/LDPE/ HDPE/HDPE/ ethylene acrylic acid (EAA) (2) 80 micron white pigmented coextruded film of linear LLD/nylon/EAA are nearly 45% less than that of laminates (3) 112 micron transparent laminate of polyester/LDPE, with individual film thickness of 12 micron/100 micron each (PET/Poly) and (4) 67.5 micron opaque laminate of polyester /Al foil/LDPE with film thickness of 12.5/12.5/42.5 micron (PET/foil/poly). Inner-most LD/EAA contributes to heat seal strength and not outer polyester layer or foil. Unrefined niger seed oil (raw) with an initial moisture content of 0.07% is in equilibrium with an rh of 56%. Oil equilibrated to even high humidities has very low equilibrium moisture content (max. 0.14% at 92% rh). There was gradual increase in

moisture content to 0.15% in film 1, 2 and 3 at the end of 75 days storage at 90% rh and 38°C. The max. moisture content attainable at 65% rh, 27°C was 0.09%. FFA changed only to 0.75% from 0.61% at the end of 90 days storage were insignificant even at 65% rh, 27°C. Peroxide value in oil reached as high as 116 in coextruded film-1. Niger seed oil contains 79-88% unsaturated fatty acids as oleic and linoleic acids which are highly susceptible to autoxidation. Coextruded LLD/NYLM/EAA and PET/poly are more suitable for niger seed oil packaging, while foil laminate is good but expensive. GS

### Soybean oils

2451

Meenakshi Rani, Chauhan (GS) and Dheer Singh. **Comparative changes in the quality of refined soybean oil and groundnut oil during intermittent frying of potato chips.** *Beverage and Food World* 20(1); 1993; 18-19

Samples of oils (soybean oils (SO) and groundnut oils (GO)) drawn after frying potato chips at 12 h interval upto 60 h were analysed for their properties. The refractive indices and viscosities increased with the increase in frying number (FN). The initial peroxide value (PV) was higher in GO (12.8 meg) than SO (2.0 meg). However, after frying, the PV of both the oils increased with FN, but with higher rate in SO. The free fatty acids value of both the oils increased consistently with increase in FN. The TBA value of both the oils increased after 4th frying and later declined at 60 h. The unsaturated fatty acids decreased with FN whereas saturated fatty acids increased. SRA.

### SPICES AND CONDIMENTS

2452

John (MD) and Jaiswal (PK). **A study on sambar and rasam powder.** *Indian Spices* 30(2-3); 1993; 24-26, 33-36

Sambar powder/masala (72 samples) and rasam powder (32 samples) collected from different parts of the country were analysed. Though they have distinct taste, colour



characteristics and are used for different dishes, it is possible to bring both the powders under one standard. SRA

## Condiments

### Papads

2453

Nivedita Singh, Pratima Awasthi, Usha (MS) and Chauhan (GS). **Effect of defatted soyflour addition on the quality characteristics of blackgram papad.** *Beverage and Food World* 20(1); 1993; 13-15

This study showed that in papad making blackgram flour could be substituted by defatted soyflour (DSF) upto 25%. Padads made from urad-DSF flour blend containing 25% DSF by wt. had these texture characteristics: breaking load under compression,  $4.369 \text{ KN} \times 10^1$ , Tension,  $1.851 \text{ KN} \times 10^2$ , Puncture,  $0.944 \text{ KN} \times 10^1$  and Shear,  $1.848 \text{ KN} \times 10^2$ . The moisture, crude fat aci insoluble ash and alkalinity of ash of urad-DSF papads were below the max. limits of the Indian Standard Specification for papad. The crude fibre and total ash contents exceeded the limits by 1 to 2%. The urad-DSF papad was rates as "very good" on a ten-point scale in a consumer acceptance survey of 60 families. AA

2454

Satish (HS) and Crown (JK). **Machine for making leaf cups/trays and pappads.** *ASEAN Food Journal* 8(1); 1993; 38-41

Reports the design features of a leaf cup (Donne)/tray and pappads making machine developed at CFTRI, Mysore (India). In leaf cup/tray making machine, the flat leaf is formed into a cup/tray between male and female dies and in pappad making, the dough balls are pressed between two circular plates to get very thin flat sheets. Since both machines are based on a toggle mechanism and the presence of flexibility in the die/plate assemblies, a single machine which can be used for both leaf cup/tray and pappad production. To produce different shapes of cups/trays, only the upper and lower die head assemblies need to be changed. Similarly for switching over from leaf cup/tray to pappad

operation, the dies are to be replaced with plates. The machine which can produce 100 - 250 leaf trays per hour and 500 papads per hour cost Rs. 6000/-. SRA

### Coriander

2455

Thakere (BD) and Thakur (RS). **Studies on storage pattern of coriander (*Coriandrum sativum*) in M.P.** *Bulletin of Grain Technology* 30(2); 1992; 141-144

Problems of coriander storage and requirement of storage structures were surveyed. Max. number of farmers (66.7%) cultivated the coriander crop on < 25% of their total land holding. Almost all the farmers stored < 25% of the total production for self-consumption and seed purpose. More than 50% farmers used gunny bags for storage of coriander followed by earthen pots. No chemical was used for insect control during the storage as there was no infestation up to one yr in well dried and cleaned coriander. AA

### Olives

2456

Brenes (M), Garcia (P), Duran (MC) and Garrido (A). **Concentration of phenolic compounds change in storage brines of ripe olives.** *Journal of Food Science* 58(2); 1993; 347-350

The effects of cv, salt concn. and temp. on changes in phenolic compounds during storage of ripe olives were studied using a  $2^3$  factorial design. The effect of salt was negligible. Higher temp. increased phenols diffusion rate into brines for two cvs assayed. The cvs, Hojiblanca Cacerena varied in polyphenol content. Throughout storage there was hydrolysis of glucosides initially in flesh (oleuropein, verbascoside and luteolin 7-glucoside due to the acidic conditions. This effect caused the content of oleuropein in brines to always be lower than 1.5 mM and resulted in a continuous increase in level of hydroxytyrosol. AA



2457

Fleming (HP), Thompson (RL) and McFeeters (RF). **Firmness retention in pickled peppers as affected by calcium chloride, acetic acid, and pasteurization.** *Journal of Food Science* 58(2); 1993; 325-330, 356

Critical factors influencing firmness retention in pickled peppers were studied. The addition of  $\text{CaCl}_2$  (0.2%, w/v, optimum) to whole, pickled 'Red Cherry' peppers increased firmness retention as determined by a puncture test using an Instron Universal Testing Machine. Pasteurization reduced firmness in the absence, but not in the presence, of added  $\text{CaCl}_2$ .  $\text{CaCl}_2$  significantly ( $P$  less than or equal to 0.01) reduced softening during storage of 'Red Cherry' peppers at higher temp. (36.7, 46.7°C), and resulted in a slight increase in firmness at 26.7°C.  $\text{CaCl}_2$  did not significantly ( $P$  greater than or equal to 0.05) improve firmness retention in 'Jalapeno' peppers, but resulted in greater uniformity of firmness.  $\text{CaCl}_2$  also improved firmness retention in pickled cucumbers. Firmness of unpasteurized peppers and cucumbers was not influenced significantly ( $P$  greater than or equal to 0.05) by acetic acid concn. of 2, 3 or 4%. AA

## SENSORY EVALUATION

2458

Murphy (C). **Nutrition and chemosensory perception in the elderly.** *CRC Critical Reviews in Food Science and Nutrition* 33(1); 1993; 3-15

This article briefly reviews some of the literature that demonstrates age-associated changes in elderly person's perception of foods and food flavour. Covers, taste (threshold, superthreshold intensity, weber ratios), olfactions (thresholds, nasal disease, superthreshold intensity, odour identification), chemosensory preference, pleasantness of sucrose and sodium chloride, and nutrition and chemosensory perception. 64 references. SRA

2459

Schiffman (SS). **Perception of taste and smell in elderly persons.** *CRC Critical Reviews in Food Science and Nutrition* 33(1); 1993; 17-26

Chemosensory losses that have been measured in older people, including elevated thresholds as well as decrements in discrimination and identification of chemical stimuli are described in this article. Chemosensory losses result from normal aging, certain disease states (Alzheimer's disease), pharmacological and surgical interventions, radiation, and environmental exposure. Scientific research into methods of compensating for these losses are also covered. These innovations include adding commercial flavour to increase food intake and offset poor nutrition as well as development of chemical models that may finally offer treatment possibilities for taste and smell losses in the elderly. 26 references. SRA

2460

Stevens (JC) and Cain (WS). **Changes in taste and flavour in aging.** *CRC Critical Reviews in Food Science and Nutrition* 33(1); 1993; 27-37

This study aims at understanding the role of mixtures (mutual quality suppression) in the evaluation of impact of the human aging process on the perception of taste. The discrimination of "missing ingredients", thresholds of smell and taste (threshold vs superthreshold sensitivity : analogies in the sense of hearing, superthreshold assessments of taste and smell, taste thresholds in water vs tomato), studies of mixture suppression in young and elderly (NaCl threshold as a function of citric acid as masker, citric acid threshold as a NaCl masker, sucrose thresholds as a function of citric acid masker, citric acid thresholds as a function of sucrose concn. as masker) and some conclusions are the aspects covered. 24 references. SRA

2461

Peleg (M). **Tailoring texture for the elderly: theoretical aspects and technological options.** *CRC Critical Reviews in Food Science and Nutrition* 33(1); 1993; 45-55

Definitions and terminology, special requirements of the elderly, psychophysical,



physiological and mechanical considerations (psychophysical relationships, mechanoreceptors, mastication rate, fatigue, sensitivity, rheological considerations), technological options (modification of existing products-fruits and vegetables, restructured fruits and vegetables, restructured steaks and other meat products, extruded and puffed cereal products, pasta and bakery products; unconventional texturized products - gum based products, liquid encapsulated in gelled bubbles, agglomerates, aggregates, combination of the preceding) are the aspects covered in this article. 32 references. SRA

2462

Wysocki (CJ) and Pelchat (ML). **The effects of aging on the human sense of smell and its relationship to food choice.** *CRC Critical Reviews in Food Science and Nutrition* 33(1); 1993; 63-82

This article reviews previously published observations on the effects of age on olfaction and food preferences and presents results of original analyses of data derived from a substantial database formed as a result of the National Geographic smell survey. The topics of the survey are relevant to present article. Two of the odors in the survey were food related and two were fragrance related. Aspects covered are, age and odour perception, age, odour perception and food preferences, age and olfactory-guided behaviour: new observations (perfume-related odours, odours of edibles). 39 references. SRA

2463

Clydesdale (FM). **Colour as a factor in food choice.** *CRC Critical Reviews in Food Science and Nutrition* 33(1); 1993; 83-101

Review covers the effect of colour on taste thresholds, sweetness perception, perception of pleasantness, perception of saltiness, flavour, acceptability and preference, sensory perception of elderly population. 39 references. SRA

## FOOD STORAGE

2464

Kanjilal (SC), Bansode (PC), Agrawal (AK) and Sone la. **Development of a stone slab bin using reinforced cement concrete columns.** *Bulletin of Grain Technology* 30(3); 1992; 213-217

The Jabalpur field station of Indian Grain Storage Institute designed a stone slab bin (wall size 1.0 x 0.6 metre, floor size 1.16 x 1.16 metres, internal dimension 1.05 x 1.05 x 1.2 metre) using pre-cast RCC pillars with an approx. cost of Rs. 1600, to store 10 quintals of food grains. The grooves on all sides facilitate construction of adjoining bins of the same capacity for increased storage capacity at reduced cost of construction. GS

## INFESTATION CONTROL AND PESTICIDES

2465

Rajendran (S). **Insecticide and fumigant resistance of stored product insects in India.** *Bulletin of Grain Technology* 30(2); 1992; 164-169

Reviews the status of insecticide and fumigant resistance of stored product insects in India, instances of control failures in field fumigations prophylactic spray treatments and detection of resistant strains in cargoes. GS

## BIOCHEMISTRY AND NUTRITION

2466

Dickinson (E). **Emulsifying and foaming properties of proteins. Proceedings of the conference on functional properties of macromolecules organised by Leeds University, England during 12-13th Sep 1991.** *Food Science and Technology Today* 6(3); 1992; 152-155

Reviews the 3 main types of instabilities in an oil-in-water emulsion such as - creaming, flocculation and coalescence; protein adsorption in emulsions and foams; molecular factors affecting functionality of different proteins, cooperative and competitive interactions with other chemical components



affecting the functional properties of food proteins; and the molecular and physical requirements for satisfactory emulsion and foam stabilisation by pure proteins. 36 references. GS

2467

Engeseth (NJ), Gray (JU), Booren (AM) and Asghar (A). **Improved oxidative stability of veal and cholesterol through dietary vitamin E supplementation.** *Meat Science* 35(1); 1993; 1-15

Daily supplementation (suppl.) of veal calves with 500 mg vitamin E in the form of  $\alpha$ -tocopherol acetate for 12 wks after birth increased muscle and membranous  $\alpha$ -tocopherol concn. approx. 6-fold over those of control animals. Oxidative stability of mitochondrial and microsomal lipids was enhanced by dietary suppl. Muscle lipid and cholesterol stability was also improved by suppl. This indicates the potential for a suppl. program in food producing animals in order to produce higher-quality meat and meat products and to protect the consumer from the potentially deleterious biological effects of lipid oxidation products. SRA

## TOXICOLOGY

2468

Levin (RE). **Paralytic shellfish toxins: Their origin, characteristics and methods of detection. A review.** *Journal of Food Biochemistry* 15(6); 1991; 405-417

Paralytic shellfish toxin derivatives of saxitoxin (SXT) are a group of nonprotein toxins associated with shellfish that are derived intracellularly from dinoflagellate algal cells such as *Alexandrium catenella*, *A. tamarense* and *Gymnodinium catenatum*. Recent reports indicate that pure cultures of bacteria harbored by the dinoflagellates intracellularly are capable of producing several of the toxins. The fundamental structure is that of saxitoxin,

with 17 derivatives presently recognized, all of which exhibit varying levels of sodium channel blockage of neurons, resulting in neurological symptoms and paralysis at sufficiently high dosage. The toxins can be purified using adsorption chromatography on Sephadex G-15 or Bio-gel P-2 followed by cation-exchange chromatography. The toxins are readily resolved with silica gel thin layer chromatography, and can be visualized by oxidation with  $H_2O_2$  resulting in highly fluorescent derivatives. In recent years the mouse bioassay has been supplemented with ELISA assays, HPLC for resolution followed by post-column oxidative derivatization for detection and quantitation of the various derivatives, as well as a mammalian neuroblastoma cell assay, which is highly specific for sodium channel blocking agents. AA

## FOOD LAWS AND REGULATIONS

2469

Bailey (GS) and Williams (DE). **Potential mechanisms for food-related carcinogens and anticarcinogens.** *Food Technology* 47(2); 1993; 105-118

This review examines the diet-cancer relationship by focusing on potential mechanisms through which dietary carcinogens (mycotoxins, nitrosamines and nitroamides, polycyclic aromatic hydrocarbons, amino acid pyrolysis products, natural carcinogens and food additives) and anticarcinogenic modulators (metabolic pathways leading to carcinogenic activation and detoxication, DNA adduction and repair in target cells, carcinogen activation of dominant transforming genes, deletion of recessive tumor suppressor genes and nongenotoxic carcinogens and tumor promoters) may influence variance in cancer rates among human populations. 114 references. CSA





# AUTHOR INDEX

- Abdel-Gawad (AS)  
2280
- Abu-Tarboush (HM)  
2377
- Adamo (C)  
2363
- Adesina (AA)  
2434
- Agrawal (AK)  
2464
- Agrawal (MD)  
2436
- Ahn (DU)  
2397 2398 2399
- Ahuyah (A)  
2397
- Ajuyah (AO)  
2375
- Akanya (HO)  
2310
- Akinwunmi (I)  
2381
- Alimon (H)  
2234
- Altamirano (RC)  
2226
- Altman (NS)  
2396
- Alzamora (SM)  
2314
- Ames (JM)  
2230
- Amiot (MJ)  
2309
- Ang (CYW)  
2393
- Annapure (SG)  
2270
- Anvita Shaw  
2218
- Aparnathi (KD)  
2360
- Appaiah (KM)  
2267
- Apte (D)  
2417
- Areas (JAG)  
2303
- Arjunan (A)  
2334
- Arora (A)  
2311
- Arora (KK)  
2263
- Asghar (A)  
2387 2467
- Ashman (RB)  
2275
- Aubert (S)  
2309
- Babic (I)  
2309
- Baggerman (WI)  
2239
- Bailey (GS)  
2469
- Bailey (ME)  
2382
- Bains (GS)  
2290
- Bakhshi (AK)  
2268
- Balakrishnan (K)  
2334
- Balasubramanyam (N)  
2450
- Ballesteros (SA)  
2243
- Banka (L)  
2402
- Bansode (PC)  
2464
- Barbut (S)  
2391
- Barrett (DM)  
2324
- Bassal (A)  
2224
- Bastrash (S)  
2315
- Batish (VK)  
2352
- Bauer (DL)  
2407
- Becarevic (A)  
2402
- Beelman (RB)  
2245
- Beerh (OP)  
2313
- Begum (M)  
2306
- Belamri (M)  
2308
- Beleia (A)  
2304
- Benedito de Barber (C)  
2347
- Berna (A)  
2428
- Berodier (F)  
2363
- Berry (SK)  
2313
- Bhalla (TC)  
2325
- Bhandania (AG)  
2368
- Bhat (GS)  
2250
- Bhatt (S)  
2342
- Bhattacharya (DK)  
2327 2438
- Bhattacharya (L)  
2287 2289
- Bhavani Sanker (K)  
2328
- Biedermann (M)  
2441
- Blackburn (CDW)  
2219
- Blaschek (HP)  
2380

Bock (MA)  
 2279  
 Bodhankar (SS)  
 2270  
 Bolchi (A)  
 2373  
 Bolin (HR)  
 2336  
 Bonestroo (MH)  
 2435  
 Booren (AM)  
 2467  
 Boschelle (O)  
 2241  
 Boyacioglu (D)  
 2346  
 Bozzini (JP)  
 2243  
 Bracchi (PG)  
 2373  
 Brar (S)  
 2360  
 Brenes (M)  
 2456  
 Bressani (R)  
 2283  
 Buchanan (RL)  
 2240  
 Buckley (DJ)  
 2387  
 Bush (RK)  
 2305  
 Cain (WS)  
 2460  
 Camara (MM)  
 2335  
 Camire (ME)  
 2311  
 Careche (M)  
 2420  
 Castaigne (F)  
 2315  
 Casterline (JLJr)  
 2323  
 Cerda (A)  
 2231  
 Cerda (V)  
 2231

Chakraborty (P)  
 2300  
 Chakraborty (S)  
 2436  
 Chandrasekhar (TC)  
 2416  
 Chaturvedi (RV)  
 2292  
 Chaudhuri (S)  
 2438  
 Chauhan (BM)  
 2266  
 Chauhan (GS)  
 2276 2451 2453  
 Chauhan (PM)  
 2296  
 Chauhan (SK)  
 2322  
 Chavan (JK)  
 2345 2446  
 Chavan (UD)  
 2446  
 Chiang (BH)  
 2400  
 Chirife (J)  
 2243  
 Chism (CW)  
 2235  
 Choudhury (BS)  
 2285  
 Christie (IS)  
 2368  
 Chrystall (BB)  
 2385  
 Claus (JR)  
 2390  
 Clydesdale (FM)  
 2463  
 Clyne (J)  
 2426  
 Conner (JM)  
 2426  
 Cooksey (K)  
 2380  
 Creamer (LK)  
 2355  
 Crown (JK)  
 2454

Crum (AD)  
 2379  
 Czarnecki (Z)  
 2293  
 Czuchajowska (Z)  
 2348 2349  
 D'Appolonia (BL)  
 2346  
 Dahlin (K)  
 2258  
 Dainty (R)  
 2378  
 Dal Bo (A)  
 2241  
 Das (KL)  
 2366  
 Das (KP)  
 2372  
 Das (NP)  
 2411 2412  
 Davidek (PJ)  
 2229  
 Dawood (AA)  
 2377  
 Debeaufort (F)  
 2223  
 Decker (EA)  
 2379  
 de la Torre (AH)  
 2425  
 Delgado (MMM)  
 2425  
 Devarajan (S)  
 2404  
 Devine (CE)  
 2385  
 Dharmalingam (C)  
 2302  
 Dheer Singh  
 2451  
 Dickinson (E)  
 2437 2466  
 Diestre (A)  
 2388  
 Diez (C)  
 2335  
 Dinesh (AY)  
 2354



Dominguez (J)

2316

Dora (KC)

2416 2423

Drdak (M)

2226

Dubey (A)

2260

Dubey (NK)

2269

Duhan (A)

2266

Duran (MC)

2456

Durst (RW)

2324

Dutta (A)

2289

Edwards (CG)

2427

Eichinger (HM)

2389

Ekasari (I)

2435

El-Shamel (Z)

2249

El-Zoghbi (M)

2249

Elhardallou (SB)

2281

Engeseth (NJ)

2467

Fakhereddine (L)

2308

Fenton (TW)

2375

Ferrer (S)

2238

Ferreres (F)

2430

Fleming (HP)

2457

Fokkens (RH)

2435

Forcen (M)

2428

Forteza (R)

2231

Fratamico (PM)

2240

Frazier (PJ)

2257

Fryer (PJ)

2221

Galzy (P)

2247

Gandhi (AP)

2298 2301

Gandhi (DN)

2369

Garcia (P)

2456

Garcia-Viguera (C)

2430

Garrido (A)

2456

Gates (KW)

2407

Germa (JB)

2413

Ghatak (PK)

2356

Ghosh (S)

2327

Gibbs (PA)

2219

Giovanelli (G)

2433

Gispert (M)

2388

Gogolewski (M)

2445

Gopakumar (K)

2415

Gopala Rao (S)

2232

Gopalan (M)

2278

Goyal (GK)

2369 2370

Graajhuis (AE)

2385

Grant (IR)

2248 2384

Gray (JI)

2387 2467

Gregg (LL)

2390

Griffith (C)

2220

Grob (K)

2441

Grover (S)

2352

Gujska (E)

2293

Guzman-Maldonado (H)

2316

Hackney (CR)

2390

Hagtvedt (T)

2378

Han (S)

2339

Hardin (RT)

2375

Harjinder Singh

2355

Hasain (S)

2439

Hasan (SQ)

2444

Hassan Shazali (ME)

2277

Haug (A)

2387

Haung (Y-W)

2407 2393

Hedge (G)

2416

Heisswolf (E)

2389

Herian (AM)

2305

Herrero (L)

2363

Hertzman (C)

2383

Hettiarachchy (NS)

2346

Hiremath (GG)

2423

Horner (B)

2414

Hotchkiss (JH)	Joshi (VK)	Kornacki (JL)
2396	2322	2358
Hough (G)	Kachare (DP)	Koster (T)
2314	2446	2239
Hsi-Mei Lai	Kadam (SS)	Kreider (WD)
2225	2345 2446	2274
Huang (C-C)	Kaluwin (C)	Ku (Y)
2392	2409	2323
Hung (T)	Kanjilal (SC)	Kubelka (V)
2282	2464	2229
Huxsoll (CC)	Karovicova (J)	Kugino (K)
2336	2226	2410
Iaizzo (PA)	Kaur (M)	Kugino (M)
2389	2294	2410
Ida (EI)	Kausar (R)	Kuila (RK)
2304	2365	2367
Idziak (ES)	Kaushik (BD)	Kulkarni (AN)
2242	2442	2408
Ikediobi (CO)	Kauwar (HV)	Kulkarni (PR)
2310	2371	2254
Indani (SB)	Keener (HM)	Kumar (S)
2270	2273 2274	2260
Intarapichet (K-O)	Keshava Prasad (PK)	Kuyper (L)
2382	2250	2246
Itoh (K)	Keshavan (R)	Labuza (TP)
2272	2408	2236
Iwahara (M)	Khan (AA)	Ladaniya (MS)
2222	2331	2333
Iwamoto (T)	Khan (K)	Lakin (AL)
2222	2293	2312
Jack (FR)	Khanna (SK)	Lakshmanaperumalsamy (P)
2364	2251	2418
Jagdiswari Rao	Khedkar (CD)	Lakshminarayana (K)
2259	2371	2295
Jain (RK)	Kim (WJ)	Lal (J)
2264	2237	2263
Jaiswal (PK)	Kincal (NS)	Lal (S)
2452	2339	2263
Jensen (KA)	Kininori (T)	Langston (SW)
2427	2344	2396
Joginder Singh	Kinsella (JE)	Lavanchy (P)
2370	2372	2363
John (MD)	Kirleis (AW)	Leach (G)
2452	2275	2432
Joshi (GJ)	Kishore (N)	Lebert (A)
2313	2269	2224
Joshi (M)	Klein (BP)	Ledahudeova (K)
2325	2380	2229



Ledward (D)  
2228  
Lee (T-C)  
2403  
Lelievre (J)  
2340  
Lembhe (AF)  
2371  
Levin (RE)  
2468  
Liao (C-C)  
2235  
Lin (C-W)  
2392  
Lindsay (RC)  
2376  
Lopez (V)  
2376  
Lopez-Leiva (MH)  
2297 2299  
Lorenz (K)  
2258  
Lorri (W)  
2256  
Lozano-de-Gonzalez (PG)  
2324  
Machida (H)  
2343  
Madaiah (N)  
2429  
Madanagopal (B)  
2302  
Madhava Rao (NN)  
2328  
Madl (RL)  
2233  
Maharaj (R)  
2329  
Maithilli Rao  
2417  
Majumder (SK)  
2306  
Makarios-Laham (IK)  
2403  
Makhlouf (J)  
2315  
Manan (JK)  
2313

Manuel Sa (M)  
2337  
Manzano (P)  
2321  
Marante (RA)  
2425  
Mariani (C)  
2441  
Marriott (NG)  
2390  
Marth (EH)  
2358  
Martin-Polo (M)  
2223  
Martinez (G)  
2326  
Martinez-Anaya (MA)  
2347  
Masud (T)  
2365  
Mathew (PT)  
2415  
Matsuoka (T)  
2409  
Mau (JL)  
2245  
McFeeters (RF)  
2457  
McGill (AEJ)  
2246  
McKeith (FK)  
2380 2386  
McLellan (MR)  
2431  
Meenakshi Rani  
2451  
Mehrotra (NN)  
2218  
Mehta (U)  
2286 2294  
Miller (AR)  
2338  
Miller (KL)  
2448  
Mishra (AK)  
2269 2367  
Misra (PR)  
2366

Mittal (GS)  
2391  
Miuro (M)  
2343  
Mohamed (AA)  
2275  
Monahan (FJ)  
2387  
More (DR)  
2351  
Morishita (Y)  
2272  
Morrissey (PA)  
2379 2387  
Muir (PD)  
2385  
Mukhopadhyay (S)  
2300  
Mulet (A)  
2428  
Murao (S)  
2222  
Murphy (C)  
2458  
Nagaraja (KV)  
2267  
Nagata (S)  
2222  
Naik (HR)  
2450  
Nair (BM)  
2297 2299  
Nair (PM)  
2421  
Nanjundaswamy (AM)  
2429  
Naqvi (SAMH)  
2333  
Natarajaratnam (N)  
2334  
Nguyen-The (C)  
2309  
Nibbering (NMM)  
2435  
Nieto (JL)  
2430  
Nilamani Das  
2290

Nimje (PM)  
 2298 2301  
 Niranjana (K)  
 2432  
 Nishiyama (J)  
 2344  
 Nithianandan (V)  
 2282  
 Nivedita Singh  
 2453  
 Nixon (CR)  
 2384  
 Noel (T)  
 2341  
 Noel (Y)  
 2363  
 Nogala-Katucka (M)  
 2445  
 Nok (AJ)  
 2310  
 Nomura (Y)  
 2222  
 Nursten (HE)  
 2252  
 Obisanya (MO)  
 2434  
 Ogintimein (GB)  
 2434  
 Ohba (R)  
 2401  
 O'live (MA)  
 2388  
 Olsson (U)  
 2383  
 Osman (SM)  
 2444  
 Ottonello (S)  
 2373  
 Owusu (RK)  
 2437  
 Padilla-Zakour (O)  
 2431  
 Padmanaban (NR)  
 2319  
 Pal (PK)  
 2327  
 Panda (PC)  
 2395

Papadopoulou (K)  
 2230  
 Parasher (RC)  
 2276  
 Pardo (I)  
 2238  
 Paredes-Lopez (O)  
 2284 2316  
 Park (K-H)  
 2262  
 Park (YW)  
 2374  
 Parker (AH)  
 2407  
 Patel (NC)  
 2296  
 Patel (RK)  
 2353  
 Pateras (IMC)  
 2350  
 Paterson (A)  
 2364 2426  
 Patterson (MF)  
 2248 2384  
 Paul (S)  
 2265  
 Pek (U-H)  
 2262  
 Pelchat (ML)  
 2462  
 Peleg (M)  
 2461  
 Peterkin (PI)  
 2242  
 Peterson (JC)  
 2427  
 Petrovic (S)  
 2402  
 Philip (R)  
 2418  
 Piggott (JR)  
 2364 2426  
 Pilhofer (G)  
 2413  
 Pilnik (W)  
 2435  
 Pitarch (B)  
 2347

Pitotti (A)  
 2241  
 Pomeranz (Y)  
 2348 2349  
 Ponappa (T)  
 2338  
 Poonam Singh  
 2287  
 Powers (JR)  
 2427  
 Prakash (A)  
 2259  
 Prasad (T)  
 2260  
 Pratima Awasthi  
 2453  
 Preclik (L)  
 2226  
 Prestamo (G)  
 2321  
 Pretel (MT)  
 2326  
 Proulx (WR)  
 2279  
 Prudencio-Ferreira (SH)  
 2303  
 Punia (D)  
 2266  
 Purinima Mathur  
 2218  
 Puteh (MF)  
 2234  
 Pyle (L)  
 2432  
 Radadia (LB)  
 2296  
 Raghuvanshi (RS)  
 2291  
 Rajendran (C)  
 2334  
 Rajendran (S)  
 2465  
 Rajniakova (A)  
 2226  
 Rama Murthy (MK)  
 2357  
 Ramachandran (A)  
 2406



Ramamurthy (R)  
2278  
Ramanathan (L)  
2411 2412  
Ramsey (CB)  
2381  
Ranganathan (N)  
2406  
Ranhotra (GS)  
2447  
Rathi (SD)  
2351  
Ratomahenina (R)  
2247  
Ravasini (G)  
2433  
Ravi Prasad (P)  
2439  
Ravishankar (CN)  
2424  
Rawat (BS)  
2362  
Rayas-Duarte (P)  
2288  
Reid (DG)  
2221  
Reyes-Moreno (C)  
2284  
Riaublanc (A)  
2247  
Richter (ER)  
2235  
Ring (S)  
2341  
Riquelme (F)  
2326  
Robinson (DS)  
2331  
Romojaro (F)  
2326  
Rosenthal (AJ)  
2350  
Roy (A)  
2300  
Roy (PK)  
2366  
Roychoudhury (P)  
2442

Rupnow (JH)  
2288  
Rustom (IYS)  
2297 2299  
Saini (SPS)  
2290  
Sakiyama (T)  
2339  
Salji (J)  
2361  
Samah (OA)  
2234  
Samoon (AH)  
2244  
Samuel (CT)  
2406  
Sandberg (A-S)  
2256  
Sanjeev (S)  
2419  
Sankar (TV)  
2422  
Sankat (CK)  
2329  
Sapru (V)  
2236  
Sarkar (S)  
2359 2367  
Sastry (BS)  
2232  
Sastry (CSP)  
2232  
Sastry (GSR)  
2439  
Satish (HS)  
2454  
Savnah (BH)  
2370  
Saxena (AK)  
2268  
Scheerens (JC)  
2338  
Schiffman (SS)  
2459  
Schmidt (SJ)  
2225  
Schols (H)  
2432

Schols (HA)  
2435  
Schreier (PJR)  
2221  
Schreurs (FJG)  
2394  
Schultz (FJ)  
2240  
Sciarini (MJ)  
2274  
Sebranek (JG)  
2386  
Seewald (MJ)  
2389  
Seghal (KL)  
2268  
Seghal (VK)  
2265  
Seguchi (M)  
2271  
Selamat (J)  
2234  
Selman (J)  
2217  
Sengupta (T)  
2300  
Senthil (C)  
2442  
Serenio (AM)  
2337  
Serrano (M)  
2326  
Serrao (AD)  
2423  
Sethu Rao (D)  
2250  
Setty (TMR)  
2424  
Shah (MA)  
2365  
Shah (US)  
2368  
Shankar (PA)  
2354  
Shantha (NC)  
2379  
Sharma (DP)  
2395

Sharma (KS)	Singh (S)	Syed (HM)
2330	2362	2270 2351
Sharma (PC)	Singhal (RS)	Tagliavini (J)
2330	2254	2373
Sharma (R)	Sitarama Rao (K)	Tan (S)
2322	2439	2437
Sharma (S)	Soharab	Taniguchi (H)
2291	2216	2272
Sharpe (AN)	Sone Lal	Tantaoui-Elaraki (A)
2242	2464	2308
Shekar Shetty (H)	Squella (J)	Tatini (SR)
2295	2363	2352
Shetty (TS)	Sreenivasa (MA)	Taylor (SL)
2424	2267	2305
Shi (B)	Srivastav (PP)	Tejada (M)
2387	2264	2420
Shin (T)	Stainsby (G)	Teramoto (Y)
2222	2255	2401
Shina (RK)	Stanton (J)	Thakere (BD)
2260	2449	2455
Shinohara	Stephen (J)	Thakur (KS)
2307	2419	2330
Shivshanker	Stevens (JC)	Thakur (RS)
2263	2460	2455
Shukla (IC)	Su (CK)	Thapar (VK)
2436	2400	2265
Shukla (P)	Subbaiah (K)	Thompson (LD)
2291	2318	2381
Sim (JS)	Subrahmanyam (KV)	Thompson (RL)
2375 2397 2398 2399	2317	2457
Simon (P)	Sudha (M)	Thu Thao (LT)
2226	2317	2304
Sinclair (AJ)	Sudhir Singh	Tinkerame (J)
2443	2251	2409
Singaravadivel (K)	Suliatkiewiez (E)	Tomas-Barberan (FA)
2261	2445	2430
Singh (A)	Sundarrao (K)	Tomas-Lorente (F)
2286	2409	2430
Singh (D)	Sundheim (G)	Torija (ME)
2276	2378	2335
Singh (G)	Surendra Nath (B)	Tornberg (E)
2265	2357	2383
Singh (J)	Suryanarayana Raju (G)	Tripathi (SC)
2265	2295	2292
Singh (K)	Suryawanshi (SV)	Trziszka (TL)
2409	2371	2394
Singh (NI)	Svanberg (U)	Tsai (GJ)
2429	2256	2400



Tsao (GT)	Wadhwa (BK)	Wrolstad (RE)
2400	2369	2324
Ueda (S)	Walker (AF)	Wu (W)
2401	2281	2312
Uijttenboogaart (TG)	Washington (AC)	Wu (Z-H)
2394	2374	2410
Ukoha (AI)	Watson (SA)	Wysocki (CJ)
2310	2273 2274	2462
Upadhyay (JB)	Weaver (CM)	Yahia (EM)
2368	2279	2332
Usha (MS)	Weinert (LAG)	Yamada (H)
2453	2246	2272
Vasseur (J)	Weller (KM)	Yano (T)
2224	2427	2339
Vazquez-Moreno (L)	Whittam (M)	Yasmin (HZ)
2332	2341	2351
Velisek (J)	Willemot (C)	Yook (C)
2229	2315	2262
Venugopal (V)	Williams (A)	Yoshikoshi (M)
2405 2421	2437	2343
Verma (NK)	Williams (AP)	Yousef (AE)
2362	2219	2235
Vijay Sethi	Williams (DE)	Zannoni (M)
2320	2469	2363
Viswanathan Nair (PG)	Wimmer (MP)	Zhao (J)
2422	2386	2311
Vivek Dixit	Winkler (M)	Ziegler (GR)
2292	2413	2245
Voilley (A)	Wolfe (FH)	Zlatanos (S)
2223	2397 2398 2399	2227
Voutsas (AT)	Worsfold (D)	Zuniga (M)
2227	2220	2238

10  
2



## SUBJECT INDEX

### Acetic acid

peppers, acetic acid & firmness  
in pickled 2457

### Acetobacter xylium

cocoa bean products, *Acetobacter*  
*xylium* in fermented 2234

### Acidophilus milk products

2361

### Actomyosin

hake, triolein/actomyosin  
interaction in stored 2420

### Additives

breadmaking, additives &  
deoxynivalenol containing flour  
during 2346

### Adenosine triphosphate

swine muscle, adenosine  
triphosphate & quality of 2389

### Aegle marmelos

see Bael fruit

### Aflatoxins

groundnut beverages, pH/heat  
treatment & aflatoxin B<sub>1</sub>  
contaminated 2297

### Aging

beef muscle, temp./electrical  
stimulation & aging of 2383  
food choice & aging 2462

### Amaranthus

hydrolytic depolymerization  
response surface methodology of  
amaranthus starch 2316

### Ammonium compounds

meat, ammonium compounds &  
*Staphylococcus* resistance in 2378

### Anthocyanins

colourants, anthiocyanins as 2250

### Antibiotics

seafoods, *Vibrio* antibiotic  
sensitivity in 2419

### Anticarcinogens

mechanisms of food-related  
anticarcinogens 2469

### Antioxidants

turkey patties, antioxidants &

lipid oxidation prevention in  
2398

### Apple juices

ceramic membrane microfiltration  
& modeling optimization of apple  
juices 2431

dihydrochalcones from apple  
juices 2430

enzyme-membrane filtration &  
stabilization of apple juices  
2433

processing & characteristics of  
diffusionally extracted apple  
juices 2432

### Apples

fiber, Zn binding to apple 2323

pineapple juice & enzymatic  
browning inhibition in apple  
rings 2324

*Trichoderma viride*/*Aspergillus*  
spp. produced cellulase/xylanase  
effect on apple pomace 2325

### Apricots

permeability films/ethylene  
synthesis/ripening of packaged  
apricots 2326

### Arachis hypogaea

see Groundnuts

### Aroma components

red wines/musts, aroma components  
& characterization of Majorcan  
varietal 2428

### Ascorbic acid

doughs, ascorbic acid based  
improvement of 2344

fish, Cu chelating compounds &  
ascorbic acid activity in 2412

fruits/vegetables, ascorbic acid  
& peroxidases activity in 2321

### Aspergillus

apple pomace, *Aspergillus* spp.  
produced cellulase/xylanase  
effect on 2325

### Aspergillus flavus

toria seed oils, *Asp. flavus* &

- quality of 2306
- BHA**  
khoa, BHA & shelf-life enhancement of 2369
- Bacillus cereus**  
beef, irradiation & *Bacillus cereus* toxin production in 2384
- Bacteria**  
beet juices, thermophilic bacteria from RT diffuser 2308  
curd of Bhubaneswar, bacteria in 2366  
fish extracts, bacterial growth in 2418  
homofermentative / heterofermentative lactic acid bacteria 2238  
polymer glass-transition glassy state in bacterial spores 2236  
sardine, temp. & spoilage bacteria in chilled stored Indian oil 2424  
sausages, drying time/temp. & quality of lactic acid bacteria inoculated Chinese-style 2392  
seafoods, bacteria & protein hydrolysis/quality deterioration in stored 2403
- Bacteriocins**  
biopreservatives, lactic acid bacteria bacteriocins as 2237  
*Pediococcus acidilactici* bacteriocin & inhibition of *Listeria monocytogenes* 2235
- Bael fruit**  
Aegle marmelos, chemistry of 2327
- Bakery products**  
nutritional value of non-wheat flour supplemented bakery products 2345
- Baking industries**  
emulsifier technology in Japanese baking industries 2343
- Bananas**  
nutritional values of nendran banana fruit 2328
- Batter**  
bologna, massaged minced batter based water 2390
- Beans**  
grain quality of common beans 2283
- Beef**  
Fe & lipid oxidation catalysis in beef muscle diaphragm 2379  
*Pseudomonas* produced volatile compounds in refrigerated beef 2382  
irradiation & *Staph. aureus*/*Bacillus cereus* toxin production in beef 2384  
post-packaging pasteurization & *Clostridium perfringens* in vacuum packaged beef loin 2380  
steaks, marbling/fat trim/doneness & properties of cooked beef 2381  
temp./electrical stimulation & rigor/ageing/tenderness of beef muscle 2383
- Beet juices**  
thermophilic bacteria from RT diffuser beet juices 2308
- Bengalgram**  
papads, soyflour addition & quality of Bengalgram 2453
- Betalaines**  
colourants, betalaines as 2250
- Betanine**  
thermal degradation of betanine 2226
- Beverages**  
beverages, pH/heat treatment & aflatoxin B<sub>1</sub> contaminated groundnut 2297  
fluoride detn. potentiometry in beverages 2425  
molds & spoilage of beverages by 2244  
watermelon juices, ready-to-serve beverage from 2436
- Bins**  
stone slab bins with reinforced cement concrete 2464
- Biopreservative**  
bacteriocins, biopreservative effect of lactic acid bacteria



2237

## **Blanching**

vegetables, blanching & thermal diffusivity calculations in 2314

## **Bleaching**

fats/oils, bleaching of edible 2440

## **Bologna**

batter massaged/minced based water bologna 2390

## **Bovines**

polymerase chain reaction & sex detn. in bovine meat 2373

## **Brassica campestris**

see Toria

## **Brassica juncea**

see Mustard

## **Bread**

gluten role during bread baking 2349

## **Breadfruit**

waxing/packaging/storage effects on breadfruit 2329

## **Breadmaking**

additives & deoxynivalenol containing flour during breadmaking 2346  
quality assessment chemometrics of breadmaking starters 2347

## **Breed**

pork, breeding & meat quality of 2388

## **Brines**

phenolic compounds concn. in stored brines of olives 2456

## **Broccoli**

storage controlled atm. for broccoli florets 2315

## **Bromophos**

groundnuts, bromophos residues in stored 2295

## **Buffalo milk**

Mozzarella cheese preparation, buffalo milk for 2365

## **Butter**

batch size & fat loss during table butter manufacture 2362

## **Cajanus cajan**

see Pigeonpeas

## **Cakes**

sucrose replacement by polydextrose & cake structures 2350

## **Calcium**

legumes, trypsin inhibitor activity/tannin content & Ca bioavailability in 2279

## **Calcium chloride**

peppers,  $\text{CaCl}_2$  & firmness in pickled 2457

tomatoes,  $\text{CaCl}_2$  & lycopene content in stored 2318

## **Calcium hypochlorite**

mushrooms, calcium hypochlorite & composition/colour/microbial quality of 2246

## **Callosobruchus chinensis**

chickpeas, vegetable oils residual effects against *Call. chinensis* infested 2285

## **Calothrix bharadwajae**

lipids of *Calothrix bharadwajae* 2442

## **Calothrix marchia**

lipids of *Calothrix marchia* of 2442

## **Campylobacter**

enrichment/membrane filtration methods for campylobacter isolation from fresh/frozen foods 2239

## **Candida rugosa**

lipase from *Candida rugosa* 2247

## **Canned foods**

starch-based thickener in canned foods 2254

## **Canola oils**

United States canola oils 2449

## **Carbohydrates**

fructose separation chromatography from carbohydrates 2342

## **Carbon dioxide**

mangoes, insecticidal  $\text{CO}_2$  & responses of 2332

**Carcinogens**

mechanisms of food-related  
carcinogens 2469

 **$\beta$ -Carotene**

coloured reaction product  
separation from  $\beta$ -carotene  
2230

**Carrots**

phenolic compounds in  
ready-to-eat stored carrots 2309

***Carthamus tinctorius***

see Safflower

**Casein**

bacterial growth/protein  
degradation in casein media 2418  
digestibility of k-casein  
complexes 2355

**Cashew apple juices**

clarification-ultrafiltration of  
cashew apple juices 2429

**Cellulases**

apple pomace, *Trichoderma*  
*viride*/*Aspergillus* spp. produced  
cellulase effect on 2325  
pinto bean protein fraction,  
papain/cellulase enzymes &  
extrusion of 2293

**Cellulose**

breakfast sausages, cellulose  
gums & quality of low-fat 2391

***Celosia argentea* oils**

2444

***Centaurea mosehata* oils**

2444

**Cereals**

iron availability/phytate  
hydrolysis & lactic fermentation  
of non-tannin/high tannin  
cereals 2256  
macromolecules, functions of  
cereal 2257  
nitrogen solubility of extruded  
cereals 2258

**Chapathies**

nutritional/organoleptic  
characteristics of rice bean  
supplemented chapathies 2294  
var. & quality improvement of  
chapathies 2351

**Cheddar cheese**

sensory properties/composition of  
Cheddar cheese 2364

**Cheeses**

texture of hard/semi-hard cheese  
texture 2363

**Chemical properties**

milk powders, chemical properties  
changes in vacuum roller dried  
buffalo 2370  
pigeonpea, chemical properties of  
2291  
sorghum, var. & chemical  
properties of 2276  
wheat, chemical changes in stored  
storage of Haryana 2266  
wheat, chemical properties of  
Indian 2270

**Chemometrics**

breadmaking starters, quality  
assessment chemometrics of 2347

**Chemosensory**

chemosensory perception in elders  
2458

**Chickens**

patties temp./packaging &  
stability of refrigerated stored  
chicken leg 2393  
polyphosphates & quality of  
culled dressed chicken 2395  
protein isolate cryoprotectant  
effect on frozen stored chicken  
myofibrillar 2394  
Salmonella in stored chickens 2396

**Chickpeas**

*Cicer arietinum*, mineral/phytic  
acid contents of 2286  
noodles, preparation/evaluation  
of chickpea flour supplemented  
2282  
vegetable oils residual effects  
against *Callosobruchus chinensis*  
infested chickpeas 2285

**Cholesterol**

adipose tissues, cholesterol  
contents of animal 2377  
vitamin E & cholesterol oxidative  
stability 2467



## **Chromatography**

carbohydrates, fructose  
separation chromatography from  
2342

egg white, lysozyme purification  
chromatography of 2400

## **Cicer arietinum**

see Chickpeas

## **Citrullus vulgaris**

see Watermelon

## **Clarification**

egg yolk suspensions,  
clarifications of spray-dried  
2401

## **Clostridium perfringens**

beef loin, post-packaging  
pasteurization & *Cl. perfringens*  
in vacuum-packaged 2380

## **Clouding agents**

orange/lemon peels based clouding  
agents 2249

## **Cocoa beans**

*Acetobacter xylinum* in fermented  
from cocoa bean products 2234

## **Colour**

mushrooms, modified atm.  
packaging/calcium hypochlorite &  
colour of 2246

## **Colourants**

anthocyanins/betalaines/lycopenes  
as natural colourants in food  
industry 2250  
tilapia, red sandal colour &  
colour development/growth of 2415  
toxicological evaluation of  
triarylmethane dye as food  
colours 2251

## **Colours**

colour & food choice 2463

## **Common beans**

hard-to-cook phenomenon in common  
beans 2284

## **Cooking**

beef steaks, marbling/fat  
trim/doneness & cooking loss in  
2381  
common beans, hard-to-cook  
phenomenon in 2284

legumes, cooking &  
oligosaccharide in 2280  
pigeonpea, cooking quality of 2291

## **Cooking quality**

mung bean var., cooking qualities  
of 2289

## **Copper**

fish, Cu chelating compounds &  
ascorbic acid activity in 2412  
legumes, Cu & Zn binding by  
starchy 2281

## **Coriander**

*Coriandrum sativum*, storage of 2455

## **Coriandrum sativum**

see Coriander

## **Corn**

stein breakage tester & detn. of  
corn breakage susceptibility 2273  
2274

## **Cottonseed oils**

chemical changes in stored  
cottonseed oils 2446

## **Cowpeas**

processing & oligosaccharide in  
2280  
*Vigna sinensis* var., methionine  
content in 2287

## **Crabs**

packaging stored/pasteurized crab  
meat 2407

## **Cultured milk products**

infants, cultured milk products  
for weaned/lactose-intolerant  
2359

## **Curd**

bacteria in curd of Bhubaneswar  
2366

## **Dairy industry**

ghee flavour enhancement 2367  
milk density & dairy industry 2357  
pathogens detection in dairy  
industries 2352  
status of Indian dairy industries  
2353

## **Delphinium ajacis oils**

2444

## **Deltamethrin**

paddy seeds protection by

- deltamethrin 2259  
wheat, deltamethrin residues  
detn. in 2267
- Density**  
milk, dairy industry & density of  
2357
- Deoxynivalenol**  
breadmaking, additives &  
deoxynivalenol containing flour  
during 2346
- Depolymerization**  
amaranthus starch, hydrolytic  
depolymerization response  
surface methodology of 2316
- Desmutagenicity**  
vegetables/fruits,  
desmutagenicity of 2307
- Di-t-butyl hydroquinone**  
spectrophotometric detn. of  
di-t-butyl hydroquinone 2232
- Digestibility**  
whey proteins/k-casein complexes,  
digestibility of 2355
- Dihydrochalcones**  
apple juices/jams,  
dihydrochalcones from 2430
- Dimecorn**  
fresh water mussel, dimecorn  
concn. & vitamin C content in  
2408
- Dioscorea rotundata**  
malic dehydrogenase  
purification/properties of  
*Dioscorea rotundata* 2310
- Doughs**  
ascorbic acid based doughs  
improvement 2344
- Dried foods**  
egg yolk  
suspensions/lipoproteins,  
clarification/solubilization of  
2401  
milk powder, physical/chemical  
changes in vacuum roller dried  
buffalo 2370  
peas, var./maturity & quality of  
dehydrated 2290
- Dry bean starch**  
 $\gamma$ -irradiation & physical  
properties of *Phaseolus vulgaris*  
starch 2288
- Drying**  
pears, drying & freeze/thaw  
texture improvement in 2336
- Egg whites**  
fractogel TSK CM-650 lysozyme  
isolation from hen egg-white 2402  
lysozyme purification  
ultrafiltration/chromatography  
of egg white 2400
- Egg yolks**  
spray-dried egg yolk suspensions,  
clarification of 2401
- Electron micrography**  
mustards, electron micrographic  
of 2300
- Electrophoresis**  
flat fishes, eye lens/muscle  
proteins electrophoresis of  
Bombay 2417
- Emulsifiers**  
baking industries, emulsifier  
technology in Japanese 2343  
proteins, emulsifying properties  
of 2466
- Emulsions**  
droplet size/coalescence  
stability of whey protein  
stabilized milkfat groundnut oil  
emulsions of 2372  
surfactants &  
 $\alpha$ -lactalbumin/ $\beta$ -  
lactoglobulin adsorption in  
emulsions 2437
- Enzymatic hydrolysis**  
peanut solids, extraction by  
water-effect process & enzymatic  
hydrolysis of 2299
- Enzymes**  
apple juices, enzyme-membrane  
filtration & stabilization of  
2433  
pineapple juice & enzymatic  
browning inhibition in  
fresh/dried apple rings 2324



## **Equipments**

gas formation/gas retention &  
rheofermentometer texture of 2348  
leaf cups/papad making machines  
2454

## **Escherichia coli**

foods, *Escherichia coli*  
immunomagnetic isolation from  
2240

## **Essential oils**

essential oils & fungal infection  
in stored wheat 2269

## **Ethanol**

*Staph. aureus*, ethanol conc.  
antibacterial/cell morphological  
changes in 2243

## **Ethylene**

apricots, ethylene & ripening of  
packaged 2326

## **Export**

fruits/vegetables, export of 2320  
marine products, export analysis  
of Indian 2404

## **Extruded foods**

cereals, N solubility of extruded  
2258  
potato peel, extrusion &  
properties of extruded 2311

## **Extrusion**

pinto bean protein fraction,  
papain/cellulase enzymes &  
extrusion of 2293  
potato peel, extrusion &  
properties of 2311  
soybeans, temp./moisture &  
protein-protein interactions  
during extrusion of 2303

## **Faba beans**

processing & oligosaccharide in  
fababeans 2280

## **Fat-low foods**

bologna, massaged minced batter  
based water 2390  
breakfast sausages, cellulose  
gums & quality of low-fat 2391

## **Fats**

adipose tissues, fat contents of  
animal 2377

bleaching of edible fats 2440  
butter manufacture, batch size &  
fat loss during 2362  
transesterification/sterols in  
edible fats 2441

## **Fats meat**

beef steaks, fat trim &  
properties of cooked 2381

## **Fatty acids**

$\omega$ 3 polyunsaturated fatty  
acids, nutritional quality of  
2443  
fatty acid composition of  
Alpine/Nubine bred goat  
organ/muscle meat 2374  
oils, fatty acids changes during  
refining of 2445  
polarographic estimation of fatty  
acids 2439  
shellfish, fatty acid composition  
of 2409

## **Fermentation**

cocoa bean products, *Acetobacter*  
xylium in fermented 2234  
fruits/vegetables lactic acid  
fermentation & preservation of  
2322  
mango juices, fermentation  
kinetic analysis of 2434

## **Fermented foods**

rice based fermented foods 2264

## **Fibers**

Zn binding to fibers 2323  
bread, gluten role during baking  
of 2349

## **Films**

apricots, films/ethylene  
synthesis/ripening of packaged  
2326  
edible films, polarity  
homogeneity/structure & water  
vapour permeability of 2223

## **Finfish**

*Vibrio* antibiotic sensitivity in  
finfish 2419

## **Firmness**

peppers,  $\text{CaCl}_2$ /acetic  
acid/pasteurization & firmness

in pickled 2457  
strawberries, polyamines vacuum  
infiltration & firmness of  
stored 2338

### **Fish**

bacterial growth/protein  
degradation in fish extracts 2418  
Cu chelating compounds & ascorbic  
acid activity in fish 2412  
lipoxygenase stereochemical  
specificity of fish gill 2413  
smoking of fish 2414  
spices oxidative rancidity  
inhibition in salted ground fish  
2411

### **Fish products**

sausages, potato starch powder &  
quality of fish 2416

### **Flatfish**

eye lens/muscle proteins  
electrophoresis of Bombay flat  
fishes 2417

### **Flavours**

flavour changes in aged 2460  
ghee flavour enhancement 2367  
gum arabic product in flavour for  
oxidation protection 2253  
macromolecules & flavour 2252  
meat/milk flavour components,  
thermal stability of 2376  
Scotch whisky,  
composition/flavour of oak cask  
matured 2426

### **Flours**

bakery products, nutritional  
value of non-wheat flours  
supplemented 2345

### **Fluoride**

beverages, fluoride detn.  
potentiometry in 2425

### **Food industries**

ISO standards & food industries  
2216  
lactose-hydrolysed  
manufacture/properties/  
/applications in food industries  
2360

### **Fructose**

carbohydrates, fructose  
separation chromatography from  
2342

### **Fruit juices**

clarification ultrafiltration of  
fruit juices 2429

### **Fruits**

ascorbic acid & peroxidase  
activity in fruits 2321  
desmutagenicity of fruits 2307  
export of fruit products 2320  
lactic acid fermentation &  
preservation of fruits 2322

### **Frying**

potato chips, soybean  
oil/groundnut oil quality during  
frying of 2451

### **Fumigants**

stored product insects, fumigant  
resistance of Indian 2465

### **Fungi**

toria seed oils, fungi & quality  
of 2306  
wheat, essentail oils & fungal  
infection in stored 2269

### **Fusarium**

toria seed oils, Fusarium &  
quality of 2306

### **Gelatinization**

rices, gelatinization  
characteristics of  
hydroxypropylated/cross-linked  
2262  
starch, structure/gelatinisation  
of 2341

### **Gelation**

2228  
polysaccharides, gelation of 2255

### **Ghee**

flavour enhancement in ghee 2367

### **Gingelly**

Sesamum indicum, seed  
deterioration control in 2302

### **Ginger**

fish, ginger & oxidative  
rancidity inhibition in 2411

### **Gluten**

bread, gluten role during baking



of 2349

**Glycidylalkylesters**  
chemical plant design for  
glycidylalkylesters production of  
phthalic acid 2227

**Goats**  
fatty acids composition of  
Alphine/Nubine bred goat organ  
2374

**Grapes**  
processing of Himachal Pradesh  
grown grape cvs 2330

**Groundnut oils**  
chemical changes in stored  
groundnut oils 2446  
droplet size/coalescence  
stability of whey protein  
stabilized milkfat groundnut oil  
emulsions 2372  
potato chips, groundnut oil  
quality during frying of 2451

**Groundnuts**  
Arachis hypogaea, harvesting &  
yield/quality of 2298  
beverages, pH/heat treatment &  
aflatoxin B<sub>1</sub> contaminated  
groundnut 2297  
extraction of peanut solids by  
water-effect process & enzymatic  
hydrolysis 2299  
lindane/bromophos residues in  
stored groundnut 2295  
storage characteristics of  
groundnuts 2296

**Guizotia abyssinica**  
see Niger seeds oils

**Gums**  
flavour with gum arabic products  
for protection against oxidation  
2253

**Hakes**  
triolein/hake actomyosin  
interaction in stored hake 2420

**Halothane**  
pork, halothane sensitivity &  
meat quality of 2388

**Handling**  
mandarin, post-harvest handling

of Nagpur 2333

**Harvesting**  
safflower, harvesting time &  
yield/quality of 2301

**Heat exchangers**  
khoa based sweets, scraped  
surface heat exchanger &  
manufacture of 2368

**Heat sorption**  
quince jam, temp. & sorption  
isotherms/heat sorption of 2337

**Heating**  
diffusion during electrical  
heating of foods 2221

**Heterofermentative**  
bacteria-heterofermentative  
lactic acid 2238

**Homofermentative**  
bacteria-homofermentative lactic  
acid 2238

**Homogeneity**  
edible films, homogeneity & water  
vapour permeability of 2223

**Hydration**  
soybeans, hydration & phytic.P  
lowering of 2304

**Hydrophobicity**  
pancake texture & wheat starch  
granule hydrophobicity 2271

**Industries**  
new technologies for food  
industries 2217

**Infants**  
cultured milk products for  
weaned/lactose-intolerant  
infants 2359

**Insecticides**  
stored product insects,  
insecticide resistance of Indian  
2465

**Insects**  
wheat, biochemical loss in insect  
infected stored 2265

**Iodide**  
salt, iodide detn. pyrocatechol  
violet flow injection analysis  
in table 2231

**Iron**

cereals, Fe availability & lactic fermentation of  
non-tannin/high-tannin 2256  
legumes, Fe & Zn binding by starchy 2281  
turkey meat, Fe detn. in 2399

**Irradiation**

beef, irradiation & Staph. aureus/Bacillus cereus toxin production in 2384  
dry bean starch,  $\gamma$ -irradiation & physical properties of 2288

**Jam**

dihydrochalcones from jams 2430  
quince jam, temp. & sorption isotherms/heat sorption of 2337

**Khoa**

additives & shelf-life enhancement of khoa 2369  
heat exchanger & manufacture of khoa based sweets 2368

**Lactic acid**

bacteriocins, biopreservative effect of lactic acid bacteria 2237  
fruits/vegetables, lactic acid fermentation & preservation of 2322  
homofermentative/  
/heterofermentative lactic acid bacteria 2238  
sausages, drying time/temp. & quality of lactic acid bacteria inoculated Chinese-style 2392

**Lactalbumin**

emulsions, surfactants &  $\alpha$ -lactalbumin adsorption in 2437

**Lactobacillus**

wines, Lactobacillus isolation/characterization in Washington state 2427

**Lactoglobulin**

emulsions, surfactants &  $\beta$ -lactoglobulin adsorption in 2437

**Lactose**

infants, cultured milk products for lactose-intolerant 2359  
lactose  
manufacture/properties/  
/applications in food industries 2360

**Lambs**

growth rate/pH & meat quality of lambs 2385

**Lamellidens corrinus**

see Mussel

**Leaf cups**

equipment for making leaf cups 2454

**Legumes**

Fe/Ca/Mg/Cu & Zn binding by starchy legumes 2281  
processing & oligosaccharide content in legumes 2280  
trypsin inhibitor activity/tannin content & Ca bioavailability in legumes 2279

**Lemons**

clouding agents, lemon peels based 2249

**Lentils**

processing & oligosaccharide in lentils 2280

**Leuconostoc oenos**

lysozyme lytic action on Leuconostoc oenos 2241

**Lime juices**

clarification-ultrafiltration of lime juices 2429

**Lindane**

groundnuts, lindane residues in stored 2295

**Lipase**

Candida rugosa, lipase from 2247

**Lipids**

beef muscle diaphragm, Fe & lipid oxidation catalysis in 2379  
Calothrix marchia/Calothrix bharadwajae, lipid of 2442  
meat, lipid oxidation volatiles measurement in 2375  
pomfret lipids, seasonal



- variation & autooxidation of 2422  
 porcine muscle, dietary lipid &  
 lipid oxidation in 2387  
 turkey patties, lipid oxidation of  
 cooked 2397  
 turkeys patties, hot  
 packaging/antioxidants & lipid  
 oxidation prevention in 2398
- Lipoproteins**  
 spray-dried egg yolk  
 lipoproteins, solubilization of  
 2401
- Lipoxygenases**  
 fish gill, lipoxygenase  
 stereochemical specificity of  
 2413
- Listeria monocytogenes**  
 detection hydrophobic  
 grid-membrane filter method for  
 L. monocytogenes 2242  
 inhibition of L. monocytogenes &  
*Pediococcus acidilactici*  
 bacteriocin 2235
- Lupin**  
 noodles, preparation/evaluation  
 of lupin flour supplemented 2282
- Lycopenes**  
 colourants, lycopenes as 2250  
 tomatoes, S/K/CaCl<sub>2</sub> &  
 lycopene content in stored 2318
- Lysozymes**  
 egg-white, fractogel TSK CN-650  
 lysozyme isolation from hen 2402  
 egg white, lysozyme purification  
 ultrafiltration/chromatography  
 of 2400  
*Leuconostoc oenos*, lysozyme lytic  
 action on 2241
- Mackerels**  
 preservation-radiation Indian  
 mackerels 2421
- Macromolecules**  
 flavour & macromolecules 2252
- Malic dehydrogenases**  
*Dioscorea rotundata*, malic  
 dehydrogenase  
 purification/properties of 2310
- Mandarin**  
 post-harvest handling of Nagpur  
 mandarin 2333
- Manganese**  
 legumes, Mn & Zn binding by  
 starchy 2281
- Mango juices**  
 fermentation kinetic analysis of  
 mango juices 2434
- Mangoes**  
*Mangifera indica*, peroxidase  
 isoenzyme purification from 2331  
 insecticidal oxygen/carbon  
 dioxide atm. & responses to  
 mangoes 2332
- Marbling**  
 beef steaks, marbling & &  
 properties of cooked 2381
- Margarine**  
 monolaurin  
 preparation/application in  
 margarine 2438
- Marine products**  
 export analysis of Indian marine  
 products 2404
- Marketing**  
 tomatoes, marketing analysis of  
 2319  
 tomatoes, marketing of 2317
- Mass spectrometry**  
 orange juices, mutagenic  
 compounds characterization mass  
 spectrometry in 2435
- Maturity**  
 peas, maturity & quality of  
 dehydrated 2290
- Meals**  
 safety of packed meals 2220
- Meat**  
 ammonium compounds &  
 staphylococcus resistance in  
 meat 2378  
 flavour components thermal  
 stability of meat 2376  
 lambs, growth/pH & meat quality  
 of 2385  
 lipid oxidation volatiles  
 measurement in meat 2375  
 swine muscle, adenosine

- triphosphate & storage/meat quality of 2389
- Methionine**  
cowpeas var., methionine content in 2287
- Microbial quality**  
mushrooms, modified atm. packaging/calcium hypochlorite & microbial quality of 2246
- Micrococcus freudenreichii**  
milk retentates, *Micrococcus freudenreichii* thermal inactivation in ultrafiltered 2358
- Microfiltration**  
apple juices, ceramic membrane microfiltration & modeling optimization of 2431
- Microwaves**  
popcorn, microwave popping & qualities of 2275
- Milk**  
dairy industry milk density & uses in 2357  
detection of milk from different species 2356  
flavour components, thermal stability of milk 2376  
*Salmonella* senftenberg/*Micrococcus freudenreichii* thermal inactivation in ultrafiltered milk retentates 2358
- Milk powders**  
physical/chemical changes in vacuum roller dried buffalo milk powders 2370
- Milk products**  
acidophilus milk products 2361  
*Vibrio* sp., proteinases purification/characterization from 2354
- Milkfat**  
droplet size/coalescence stability of whey protein stabilized milkfat groundnut oil emulsions of 2372
- Minerals**
- chickpeas, mineral contents of 2286  
shellfish, mineral composition of 2409
- Moisture**  
paddy, moisture loss assessment in stored 2261  
soybeans, temp./moisture & protein-protein interactions during extrusion of 2303
- Molds**  
food/beverage molds & spoilage of 2244
- Monolaurin**  
margarine/monolaurin preparation/application in 2438
- Mozzarella cheese**  
buffalo milk for Mozzarella cheese preparation 2365
- Mung bean**  
var., physical properties/cooking qualities of mung bean 2289
- Muscles**  
beef muscle, temp./electrical stimulation & on rigor/aging/tenderness of 2383  
fatty acids composition of Alphine/Nubine bred goat muscle meat 2374  
flat fishes, muscle proteins electrophoresis of Bombay 2417
- Mushrooms**  
1-octen-3-ol in stored mushrooms 2245  
packaging modified atm. calcium hypochlorite & composition/colour/microbial quality of mushrooms 2246
- Mussel**  
*Lamellidens corrianus*, dimecorn concn. & vitamin C content in fresh water mussel 2408
- Mustard**  
*Brassica juncea*, electron micrography/protein quality of 2300
- Musts**  
aroma components &



characterization of musts 2428  
**NMR**

sugar-water system, water  
mobility O-17 NMR in 2225

**Niger seed oils**

Guizotia abyssinica,  
packaging/storage of niger seed  
oils 2450

**Nitrogen**

cereals, nitrogen solubility of  
extruded 2258  
safflower, N & yield/quality of  
2301

**Noodles**

preparation/evaluation of  
chickpea/lupin flour  
supplemented noodles 2282

**Nutrition**

nutritional perception in elders  
2458

**Nutritional quality**

fatty acids, nutritional quality  
of  $\omega$ 3 polyunsaturated 2443

**Nutritional values**

bakery products, nutritional  
value of non-wheat flour  
supplemented 2345  
chapathies/paranthas, nutritional  
characteristics of rice bean  
supplemented 2294  
nendran banana, nutritional  
values of 2328  
oils, nutritional values of  
tropical 2447  
sorghum, nutrients & changes in  
earhead bug infested 2278

**Oak casks**

Scotch whisky,  
composition/flavour of oak cask  
matured 2426

**Oils**

bleaching of edible oils 2440  
high-stability oils 2448  
indigenous seed oils 2444  
nutritional/functional  
characteristics of tropical oils  
2447  
tocopherol/fatty acids changes

during refining of oils 2445  
toria seed oil, fungi & qualities  
of 2306  
transesterification/sterols in  
edible oils 2441

**Oligosaccharides**

legumes, processing &  
oligosaccharide content in 2280  
wheat bran, oligosaccharides  
structure/properties of 2272

**Olives**

phenolic compounds concn. in  
stored brines of olives 2456

**Onion**

fish, onion & oxidative rancidity  
inhibition in 2411

**Orange juices**

mutagenic compounds  
characterization UV/mass  
spectrometry in orange juices  
2435

**Oranges**

clouding agents, orange peels  
based 2249

**Organic acids**

polarographic estimation of  
organic acids 2439

**Oxidation**

beef muscle diaphragm, Fe & lipid  
oxidation catalysis in 2379  
fish, Cu chelating compounds &  
ascorbic acid activity in 2412  
fish, spices & oxidative  
rancidity in salted ground 2411  
meat, lipid oxidation volatiles  
measurement in 2375  
pomfret lipids, seasonal  
variation & autoxidation of 2422

**Oxygen**

mangoes, insecticidal oxygen &  
responses of 2332

**Packaging**

beef loin, post-packaging  
pasteurization & Clostridium  
perfringens in vacuum-packaged  
2380  
breadfruit, packaging effects on  
refrigerated stored 2329

- chicken leg patties,  
temp./packaging & stability of  
refrigerated stored 2393
- crab meat, packaging effects on  
stored/pasteurized 2407
- industries, packaging for food  
2217
- nilger seed oils, packaging of 2450
- turkeys patties, hot packaging &  
lipid oxidation prevention in  
2398
- Packaging modified atmosphere**  
mushrooms, modified atm.  
packaging &  
composition/colour/microbial  
quality of 2246
- Paddy**  
deltamethrin as paddy seed  
protectant 2259  
moisture loss assessment in  
stored paddy 2261  
volatile compounds as  
preservative for stored paddy  
2260
- Palm oils**  
chemical changes in stored palm  
oils 2446
- Pancakes**  
wheat starch granule  
hydrophobicity & texture of  
pancake 2271
- Papads**  
machines for making papad 2454  
soyflour addition & quality of  
Bengalgram papads 2453
- Papain**  
pinto bean protein fraction,  
papain/cellulase enzymes &  
extrusion of 2293
- Papayas**  
ripening changes in stored  
papayas 2335  
vol./wt. measurement of papayas  
2334
- Paranthas**  
nutritional/organoleptic  
characteristics of rice bean  
supplemented paranthas 2294
- Pasteurization**  
peppers, pasteurization &  
firmness in pickled 2457
- Pathogens**  
dairy industries, pathogens  
detection in 2352  
ready meals, foodborne pathogens  
sensitivity in chilled 2248
- Patties**  
chicken leg patties,  
temp./packaging & stability of  
stored 2393  
turkey patties, lipid oxidation  
of cooked 2397  
turkeys, lipid oxidation  
prevention by hot  
packaging/antioxidants in meat  
patties of 2398
- Pears**  
drying & freeze/thaw texture  
improvement in pears 2336
- Peas**  
var./maturity & quality of  
dehydrated peas 2290
- Pediococcus acidilactici**  
Listeria monocytogenes inhibited  
foods & P. acidilactici  
bacteriocin 2235
- Peppers**  
calcium chloride/acetic  
acid/pasteurization & firmness  
in pickled peppers 2457
- Peroxidases**  
mangoes, peroxidase isoenzyme  
purification from 2331
- Pests**  
pigeonpeas, seseli oil effect  
against storage pests of 2292
- Phaseolus vulgaris**  
see Dry beans
- Phenolic compounds**  
carrots, phenolic compounds in  
ready-to-eat stored 2309  
olives, phenolic compounds concn.  
in stored brines of ripe 2456
- Phenylalanine**  
coloured reaction product  
separation from phenylalanine



**Phosphorus**

soybeans, hydration & phytic P  
lowering of 2304

**Phthalic acid**

chemical plant design for  
glycidylalkylesters production  
from phthalic acid 2227

**Physical properties**

dry bean starch,  
 $\gamma$ -irradiation & physical  
properties of 2288  
milk powders, physical properties  
changes in vacuum roller dried  
buffalo 2370  
mung bean var., physical  
properties of 2289  
sorghum, var. & physical  
properties of 2276  
wheat, physical changes in stored  
Haryana 2266  
wheat, physical properties of  
Indian 2270

**Phytates**

cereals, phytate hydrolysis &  
lactic fermentation of  
non-tannin/high-tannin 2256

**Phytic acid**

chickpea, phytic acid contents of  
chickpea 2286  
soybeans, hydration & phytic P  
lowering of 2304

**Pigeonpeas**

Cajanus cajan, chemical  
compositin/cooking quality of  
2291  
seseli oil effect against storage  
pests of pigeonpeas 2292

**Pineapple juices**

pineapple juices & enzymatic  
browning inhibition in  
fresh/dried apple rings 2324

**Pinto beans**

papain/cellulase enzymes &  
extrusion of pinto bean protein  
fractions 2293

**Polarity**

edible films, polarity & water

vapour permeability of 2223

**Polarography**

fatty acids/organic acids,  
polarographic estimation of 2439

**Polyamines**

strawberries, polyamines vacuum  
infiltration & firmness of  
stored 2338

**Polydextrose**

cakes, polydextrose & structure  
of 2350

**Polymerase**

bovine meat, polymerase chain  
reaction & sex detn. in 2373

**Polyphosphates**

chickens, polyphosphates &  
quality of culled dressed 2395

**Polysaccharides**

structure/gelation of  
polysaccharides 2255

**Pomegranate juices**

clarification-ultrafiltration of  
pomegranate juices 2429

**Pomfrets**

lipids, seasonal variation & to  
autoxidation of pomfret 2422

**Popcorn**

microwave popping & qualities of  
popcorn 2275

**Popping**

popcorn, microwave popping &  
qualities of 2275

**Porcine**

dietary lipid/vitamin E & lipid  
oxidation in porcine muscle 2387

**Pork**

breed halothane sensitivity &  
quality of pig meat 2388  
washed mechanically separated  
pork as surimi-like meat product  
ingredient 2386

**Potassium**

tomatoes, K & lycopene content in  
stored 2318

**Potassium sorbate**

khoa, potassium sorbate &  
shelf-life enhancement of 2369

**Potato chips**

soybean/groundnut oil quality  
during potato chips frying 2451

**Potato starch**

fish sausages, potato starch  
powder & quality of 2416

**Potatoes**

dye binding & protein estimation  
in potato tissues 2312  
peel extrusion & properties of  
extruded potato 2311  
wafers preparation, var.  
suitability for potato 2313

**Potentiometry**

beverages, fluoride detn.  
potentiometry in 2425

**Powders**

sambar/rasam powderes 2452

**Preservation**

fruits/vegetables, lactic acid  
fermentation & preservation of  
2322  
industries, preservation for food  
2217  
mackerels, radiation-preservation  
of Indian 2421

**Preservatives**

paddy, volatile compounds as  
preservative for stored 2260

**Processing**

apple juices, processing &  
characteristics of diffusionally  
extracted 2432  
food processing scenario 2218  
seafood processing plants,  
process control factors in  
Kerala 2416

**Production**

tomatoes, production analysis of  
2319

**Pomfrets**

cook-chill process & shelf-life  
extension of refrigerated white  
pomfret 2405

**Protein quality**

mustards, protein quality of 2300

**Proteinases**

*Vibrio* sp.,

proteinases/characterization  
from 2354

**Proteins**

bread, gluten role during baking  
of 2349  
emulsifying/foaming properties of  
proteins 2466  
pinto bean protein fraction,  
papain/cellulase enzymes &  
extrusion of 2293  
protein quality detn. 2233  
soybeans, temp./moisture &  
protein-protein interactions  
during extrusion of 2303

**Proteins fish**

flat fishes, muscle protein  
electrophoresis of Bombay 2417  
protein degradation in fish  
extracts/casein 2418  
seafoods, bacteria & protein  
hydrolysis/quality deterioration  
in stored 2403

**Proteins meat**

chicken myofibrillar protein  
isolate, cryoprotectant effect  
on frozen stored 2394

**Proteins vegetables**

potato tissues, dye binding &  
protein estimation in 2312

**Rancidity**

fish, spices & oxidative  
rancidity in salted ground 2411

**Rasam**

rasam powders 2452

**Ready-to-eat foods**

carrots, phenolic compounds in  
ready-to-eat stored 2309  
foodborne pathogens sensitivity  
in chilled ready meals 2248

**Ready-to-serve foods**

watermelon juices, ready-to-serve  
beverage from 2436

**Red sandal**

tilapia, red sandal colour &  
development/growth of 2415

**Residues**

groundnuts, lindane/bromophos  
residues in stored 2295



- wheat, deltamethrin residues  
detn. in 2267
- Retentates**  
milk retentates, *Salmonella*  
*senftenberg*/ *Micrococcus*  
*freudenreichii* thermal  
inactivation in ultrafiltered  
2358
- Retrogradation**  
rices, retrogradation  
characteristics of  
hydroxypropylated/cross-linked  
2262
- Rheofermentometer**  
gas formation/gas retention &  
rheofermentometer 2348
- Rheological properties**  
squid mantle, softening &  
rheological properties of dried  
2410
- Rheology**  
Cheddar cheese, rheology of 2364
- Rice**  
drying loss/gain assessment in  
Haryana warehouse stored rice  
2263  
fermented foods from rice 2264  
gelatinization/retrogradation  
characteristics of  
hydroxypropylated/cross-linked  
rices 2262
- Rice bean**  
chapathies/paranthas,  
nutritional/organoleptic  
characteristics of rice bean  
supplemented 2294
- Ripening**  
apricots, films/ethylene &  
ripening of packaged 2326  
papayas, ripening changes in  
stored 2335
- Saccharides**  
5-chloromethyl-2-  
-furancarboxyaldehyde in  
saccharides 2229
- Safety**  
foods, safety prediction of 2219  
meals, safety of packed 2220
- Safflower**  
*Carthamus tinctorius*, harvesting  
time/nitrogen level &  
yield/quality of safflower 2301
- Salmonella**  
chickens, *Salmonella* in stored  
2396
- Salmonella senftenberg***  
milk retentates, *Salmonella*  
*senftenberg* thermal inactivation  
in ultrafiltered 2358
- Salt**  
iodide detn. pyrocatechol violet  
flow injection analysis in table  
salt 2231
- Sambar**  
sambar powder 2452
- Sardines**  
quality changes in frozen stored  
white sardines 2423  
temp. & spoilage bacteria in  
chilled stored Indian oil  
sardines 2424
- Sausages**  
cellulose gums & quality of  
low-fat breakfast sausages 2391  
drying temp./time & quality of  
lactic acid bacteria inoculated  
Chinese-style sausages 2392  
fish sausages, potato starch  
powder & quality of 2416
- Seafoods**  
bacteria protein  
hydrolysis/quality deterioration  
in stored seafoods 2403  
preservation-radiation seafoods  
2421  
process control factors in Kerala  
seafood processing plants 2406
- Sensory properties**  
beef steaks, marbling/fat  
trim/doneness & sensory  
properties of 2381  
chapathies/paranthas,  
organoleptic characteristics of  
rice bean supplemented 2294
- Sesamum indicum**  
see Gingelly

- Sesbania sesban oils**  
2444
- Seseli oils**  
pigeonpeas, seseli oil effect  
against storage pests of 2292
- Shelf-life**  
foods, shelf-life extension of  
2219  
khoa, additives & shelf-life  
enhancement of 2369  
seafoods, cook-chill process &  
shelf-life extension of  
refrigerated 2405
- Shellfish**  
Vibrio antibiotic sensitivity in  
shellfish 2419  
Zelonia papua, fatty acid/mineral  
composition of 2409  
origin/characteristics/detection  
of shellfish toxins 2468
- Shrikhand**  
manufacture of shrikhand 2371
- Shrimps**  
cook-chill process & shelf-life  
extension of peeled/for deveined  
shrimps 2405
- Smell**  
smell perception in elders 2459
- Smoking**  
fish, smoking of 2414
- Soaking**  
legumes, soaking &  
oligosaccharide in 2280
- Solubilization**  
egg yolk lipoproteins,  
solubilization of spray-dried  
2401
- Sorghum**  
Sorghum bicolor, var. &  
physical/chemical properties of  
2276  
nutrient changes in earhead bug  
infested sorghum 2278  
storage of Sudan sorghum 2277
- Sorghum bicolor**  
see Sorghum
- Sorption**  
quince jam, temp. & sorption  
isotherms/heat sorption of 2337
- Soy flour**  
papads, soyflour addition &  
quality of Bengalgram 2453
- Soybean oils**  
potato chips, soybean oil quality  
during frying of 2451
- Soybeans**  
allergenic activity RAST  
inhibition of soy products 2305  
hydration & phytic phosphorus  
lowering of soybeans 2304  
temp./moisture & protein-protein  
interactions during extrusion of  
soybeans 2303
- Spectrophotometry**  
di-t-butyl hydroquinone,  
spectrophotometric detn. of 2232
- Spoilage**  
food/beverage, molds & spoilage  
of 2244
- Squids**  
softening & rheological  
properties of dried squid mantle  
2410
- Stabilization**  
apple juices, enzyme-membrane  
filtration & stabilization of  
2433
- Staphylococcus aureus**  
beef, irradiation & Staph. aureus  
toxin production in 2384  
ethanol conc. antibacterial/cell  
morphological changes in Staph.  
aureus 2243
- Starch**  
canned foods, starch-based  
thickner in 2254  
functions/application of starch  
2340  
structure/gelatinisation of  
starch 2341  
thermal conductivity detn. of  
starch 2339
- Sterilizers**  
development/evaluation of rotary  
vibrated novel sterilizers 2222



## **Sterols**

oils/fats,  
transesterification/sterols in  
edible 2441

## **Storage**

breadfruit, water storage effects  
on refrigerated stored 2329  
chemical changes in stored  
palm/groundnut/cottonseed oils  
2446  
chicken leg patties,  
temp./packaging & stability of  
refrigerated stored 2393  
chicken myofibrillar protein  
isolate, cryoprotectant effect  
on frozen stored 2394  
coriander, storage of 2455  
groundnuts, lindane/bromophos  
residues in stored 2295  
groundnuts, storage  
characteristics of 2296  
mushrooms, 1-octen-3-ol in stored  
2245  
niger seed oils, storage of 2450  
olives, phenolic compounds concn.  
in stored brnes of ripe 2456  
pigeonpeas, seseli oil effect  
against storage pests of 2292  
sorghum, storage of Sudan 2277  
stone slab bins with reinforced  
cement concrete 2464  
wheat, physical/nutritional  
changes in stored Haryana 2266

## **Storage cereals**

rice, driage loss/gain assessment  
in Haryana warehouse stored 2263

## **Storage fish**

sardine, temp. & spoilage  
bacteria in chilled stored  
Indian oil 2424  
triolein/actomyosin in stored  
hakes 2420

## **Storage frozen**

white sardines, quality changes  
in frozen stored 2423

## **Storage fruits**

papayas, ripening changes in  
stored 2335

strawberries, polyamines vacuum  
infiltration & firmness of  
stored 2338

## **Storage meat**

swine muscle, adenosine  
triphosphate & storage of meat  
2389

## **Storage vegetables**

broccoli, storage controlled atm.  
for 2315  
carrots, phenolic compounds in  
ready-to-eat stored 2309  
tomatoes, S/K/CaCl<sub>2</sub> &  
lycopene content in stored 2318

## **Stored products**

insecticide/fumigant resistance  
of Indian stored product insects  
2465

## **Strawberries**

polyamines vacuum infiltration &  
firmness of stored strawberries  
2338

## **Sucrose**

cakes, polydextrose & structure  
of 2350

## **Sugar**

water mobility oxygen-17 NMR in  
sugar-water system 2225

## **Sulphur**

tomatoes, S & lycopene content in  
stored 2318

## **Surfactants**

emulsions, surfactants &  
 $\alpha$ .-lactalbumin/ $\beta$ -  
-lactoglobulin adsorption in 2437

## **Surimi**

washed mechanically separated  
pork as meat product ingredient  
2386

## **Sweets**

khoa based sweets, scraped  
surface heat exchanger &  
manufacture of 2368

## **Swines**

adenosine triphosphate &  
storage/meat quality of swine  
muscle 2389

**TBHQ**

khoa, TBHQ & shelf-life  
enhancement of 2369

**Tannins**

cereals, Fe availability/phytate  
hydrolysis & fermentation of  
non-tannin/high-tannin 2256  
legumes, tannin content & Ca  
bioavailability in 2279

**Taste**

taste changes in aged 2460  
taste perception in elders 2459

**Tenderness**

beef muscle, temp./electrical  
stimulation & tenderness of 2383

**Texture**

Cheddar cheese, texture of 2364  
cheeses, texture of hard/semi  
hard 2363  
elders, texture  
theoretical/technological  
aspects in 2461  
pears, drying & freeze/thaw  
texture improvement in 2336

**Thermal conductivity**

starch, thermal conductivity  
detn. of 2339

**Thermal degradation**

betanine, thermal degradation of  
2226

**Thermal diffusivity**

vegetables, blanching & thermal  
diffusivity calculations in 2314

**Thermal stability**

meat/milk flavour components,  
thermal stability of 2376

**Thickners**

canned foods, starch-based  
thickner in 2254

**Tilapia**

Tilapia mossambica, red sandal  
colour & colour  
development/growth of 2415

**Tilapia mossambica**

see Tilapia

**Tissues**

cholesterol/fat contents of  
animal adipose tissues 2377

**Tocopherols**

oils, tocopherol changes during  
refining of 2445

**Tomatoes**

S/K/CaCl<sub>2</sub> & lycopene  
content in stored tomatoes 2318  
production/marketing analysis of  
tomatoes 2319  
production/marketing of tomatoes  
2317

**Torla**

Brassica campestris, fungi & oil  
quality of 2306

**Toxicology**

food colours, toxicological  
evaluation of triarylmethane dye  
as 2251

**Toxins**

beef, irradiation & Staph.  
aureus/Bacillus cereus toxin  
production in 2384  
shellfish toxins,  
origin/characteristics/detection  
of 2468

**Triarylmethane**

toxicological evaluation of  
triarylmethane 2251

**Trichoderma viride**

apple pomace, Trichoderma viride  
spp. produced cellulose/xylanase  
effect on 2325

**Triolein**

triolein/actomyosin interaction  
in stored hake 2420

**Trypsin inhibitors**

legumes, trypsin inhibition  
activity & Ca availability in  
2279

**Turkey**

Fe detn. in turkey meat 2399  
hot packaging/antioxidants lipid  
oxidation prevention in turkey  
patties 2398  
patties lipid oxidation of cooked  
turkey 2397

**Turmeric**

fish, turmeric & oxidative  
rancidity inhibition in 2411



**Ultrafiltration**

egg white, lysozyme purification  
ultrafiltration of 2400

fruit juices, ultrafiltration  
clarification of 2429

**Ultraviolet radiation**

orange juices, mutagenic  
compounds characterization UV in  
2435

**Veal**

vitamin E, veal oxidative  
stability of 2467

**Vegetable oils**

chickpeas, vegetable oils  
residual effects against  
*Callosobruchus chinensis*  
infested 2285

**Vegetables**

ascorbic acid & peroxidase  
activity in vegetables 2321  
blanching & thermal diffusivity  
calculations in vegetables 2314  
desnutagenicity of vegetables 2307  
export of vegetable products 2320  
lactic acid fermentation &  
preservation of vegetables 2322

**Vigna sinensis**

see Cowpeas

**Vigna umbellata**

see Rice bean

**Vitamin C**

fresh water mussel, dimecorn  
concn. & vitamin C content in  
2408

**Vitamin E**

veal/cholesterol oxidative  
stability by vitamin E 2467

**Vitamins**

porcine muscle, vitamin E & lipid  
oxidation in 2387

**Volatile compounds**

beef, *Pseudomonas* produced  
volatile compounds in  
refrigerated 2382  
paddy, volatile compounds as  
preservative for stored 2260

**Wafers**

potato wafers preparation, var.

suitability for 2313

**Water activity**

measurement of water activity 2224

**Watermelon juices**

*Citrullus vulgaris*,  
ready-to-serve beverage from 2436

**Waxing**

breadfruit, waxing effects on  
refrigerated stored 2329

**Wheat**

biochemical loss in insect  
infected stored wheat 2265  
deltamethrin residues detn. in  
wheat residues 2267  
essential oils & fungal infection  
in stored wheat 2269  
physical/chemical characteristics  
of Indian wheat 2270  
physical/nutritional changes in  
stored Haryana wheat 2266  
var., quality of Punjab wheat 2268

**Wheat bran**

Zn binding to wheat bran 2323  
oligosaccharides  
structure/properties of wheat  
bran 2272

**Wheat starch**

pancake texture & wheat starch  
granule hydrophobicity 2271

**Whey proteins**

digestibility of whey  
protein/k-casein complexes 2355  
droplet size/coalescence  
stability of whey protein  
stabilized milkfat groundnut oil  
emulsions of 2372

**Wheys**

*Listeria monocytogenes* inhibition  
& *Pediococcus acidilactici*  
bacteriocin from whey permeate  
2235

**Whiskys**

oak casks, Scotch whisky,  
composition/flavour of oak cask  
matured 2426

**Wines**

aroma components &  
characterization of Majorcan red

wines 2428

*Lactobacillus* spp.

isolation/characterization in

Washington state wines 2427

#### **Xylanases**

apple pomace, *Trichoderma*

*viride*/*Aspergillus* spp. produced

xylanase effect on 2325

*Zelonia papua*

see Shellfish

#### **Zinc**

apple fiber/wheat bran/fiber

components, Zn binding to 2323

legumes, Fe/Ca/Mg/Cu & Zn binding

by starchy 2281

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